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Working Paper No.85

The Sircar's Idle Curiosity

Critical Evaluation of Tamil Nadu's Sources 1871-1981

by

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THE SIRCAR'S IDIE CURIOSITY

CRITICAL EVALUATION OF TAMIL NADU'S DEMOGRAPHIC SOURCES, 1871-1981

Introduction

The last hundred years of Tamil Nadu's demography have witnessed major phenomena. Starting from a period of moderate growth in the 19th century, marked also by frequent local or regional crises, the demographic regime has undergone deep transformations in its components after the last epidemic of 1918, the acceleration of mortality decline following the independence and the more recent policy emphasis on fertility reduction. This long period of demographic change has also been characterized by a nearly continuous process of migrations, even if the directions of the streams were significantly altered by the end of the colonial rule.*

However, the population dynamics have rarely been incorporated into the tableau of social and economic history of Tamil Nadu. Data paucity, their heterogeneity and dubious reliability are possibly the main reasons why they have failed to generate the interest they merit in understanding the changing structure of society. This paper, which stands as the first part of a comprehensive study of population growth in Tamil Nadu since 1871 endeavours to examine the principal demographic sources which are available to us, with special emphasis on the Census of India and the registration systems which have been evolved since the end of the last century. 1871 is probably the turning-point of the statistical history of India owing to the inception of a century-long tradition of decennial censuses which, in turn, triggered a new development in the monitoring of socio-demographic phenomena like famines, epidemiology or the natural increase of population.

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This paper places particular stress on the quality of the data pertaining to Tamil Nadu, but what follows may apply to a large extent to the demographic sources for other Indian regions. There is however a great lack of critical studies on the Indian demographic data base. To better understand the logic underlying the frequent failure of the statistical apparatus to draw an exact picture of the demographic situation, I have found it necessary to turn to the chronological evolution of the main bureaucratic institutions responsible for the production of the large quantity of data on which we rely since the late 19th century. These institutions met with a large amount of mistrust or mere indifference from the population who might have thought them to be part of "the idle curiosity of an eccentric Sircar" as a census superintendent put it.

It must also be clear that the reification process by which the census, for instance, came to offer society an inevitably distorted image of itself, borrowed most of its methods and categories -- from vague preconceptions to unpracticable concepts -- from an alien statistical tradition and the historically determined social perception of the colonial rulers. Yet, the sources of inspiration for the census of British India were extremely diverse : not only did it try to replicate the British censuses but it also tended to adapt to local conditions and respond to the rulers' specific needs. At the same time, the response to the census, be it in the form of statistically imperfect returns or the unexpected social controversies it initiated, resulted in its further "indegenization" as far as it was really feasible to translate mainly western categories for the Indian context. This was, and has remained, a very hazardous exercise as this paper will show.

I. THE CENSUS AS AN INSTITUTION : CHRONOLOGY AND FUNCTIONING

Most studies of Tamil Nadu's demographic history depends on a data base almost exclusively derived from the census sources.[1/] No country in Asia or Africa displays such a long and regular tradition of decennial censuses as India.[2/]

One cannot fail to be struck by the magnitude of the census operations and the quantity and details of census data, which made of it an undisputed leading source for historical, economic, geographical and sociological analyses of India's contemporary development starting from the second half of the 19th century.

Before any scrutiny of the census results, it is of primary importance to examine the socio-historical context of the appearance of the first population counts in British India, for it was a statistical undertaking of unmatched scope for this epoch. At the turning of the 19th century, the British found themselves ruling over a country of considerable size; the Madras Presidency which to all intents and purposes was totally subjugated in the early 1810's[3/] was itself a gigantic possession of 360,000 sq.kms of extreme heterogeneity in its populations as much as in its geographical regions. Being the product of continuous conquests over several regional powers, it was a patched up assemblage of distinct territories into a single administrative unit, a pure colonial artefact which was not to survive the Britishers' departure.

Although parts of south India had already been visited by foreign travellers (Chinese, Westerners...) before the 19th century, the British knew very little of the socio-economic structure of the country. Buchanan was deputed to south India in 1799 to explore the countryside with a view to describe the rural economy and society. At the same time, Thomas Munro surveyed the Baramahals with Read (with the first population surveys conducted there) and later the Ceded Districts in the Deccan; his aim was chiefly directed towards the establishment of an uniform fiscal system, an issue of decisive importance to the East India Company. The gradual introduction of a new land-tax system represented the first large-scale bureaucratic transformation accompanying the British military and political domination over south India. The presidency was simultaneously divided into fiscal administrative units : districts (collectorates), divisions, taluks and revenue villages.

During the 19th century, numerous surveys were launched to describe various aspects of the country, from its geological resources to its sociological diversity. But they offered at best a impressionistic picture of traditional society, based on heterogeneous materials collected at the very few places of investigation and expressed in an idiom which reflected as much the Britisher's bewilderment as their middlemen's specific perceptions.

The census of 1871 was obviously an offshoot of this trend, aiming at a better understanding of South India and its more efficient administration. Over any other approach it possessed the advantage of exhaustiveness and apparent neutrality conferred to it by statistical positivism. However, the idea of a demographic survey of the Presidency antedates the first "scientific census" of 1871 by several decades, for some of the first population counts took place some fifty years earlier. In this connection, it may not be irrelevant to stress that this idea originated from Britain itself.

At the end of the 18th century and in a period of unprecedented population growth during the inception of the Industrial Revolution in England, a raging controversy was taking place among economists about the recent demographic changes and their relationship with the development of resources, fuelled particularly by Malthus writings. 1801 was the year of the first British Census (excluding Ireland) which was subsequently repeated every ten years.4/ The first modern census, however, with a reliable enumeration procedure and a somewhat less superficial questionnaire was not taken before 1841. On examining the census schedules, it appears that it was only in 1851 that the census included the basic demographic data (sex, age in single year, matrimonial status and place of birth). The first all-India census was scheduled for 1861, but the Mutiny in the north led a shaken British administration to postpone it to 1871. The decision to conduct a detailed census in India however influenced in its timing and its contents (of which more below) by the local socio-political

context appears to have been part of a broader aim to survey the whole of the British Empire, because 1871 coincided with the first census of various other crown colonies (Straits Settlements, Ceylon...).

In the Madras Presidency, the 1871 census nevertheless was not the first demographic survey. As early as 1822, the administration was in a position to estimate its subject population. Another census was conducted in 1836-37 and it was followed by regular quinquennial estimates in 1851-52, 1856-57, 1861-62 and 1866-67.[5/] However, these were not censuses in the strict sense but rather simple head-counts providing little information beyond the subregional sex-distribution. It must be recognised that these counts (often unpublished) have so far not attracted much attention from the historians; it seems that they were chiefly collections of returns ordered by the Board of Revenue in Madras to the Collectors, probably in connection with taxation. The collectors would themselves require the same from the Tahsildhars whose task seems to have simply been of putting together returns from the Karnams (village accountants) or other government agents in non-ryotwari areas. Whatever the exact procedure might have been, it is very clear that no specific enumeration structure was set up for census-taking nor was the census preceded by any house-listing in the village or the towns.

The first censussof 1822 and 1836-37 provide blatant underestimates of the Presidency's population. In particular there was a dramatic problem of undercoverage resulting in large tracts being left unaccounted for. But since the detailed returns for individual taluks were not published, the nature and extent of the coverage can only be guessed.

Another likely factor of underestimation was the specific undercount of segments of the population by the enumerators, an issue which will be examined in greater detail in the next chapter. As a result, the population of the Madras Presidency appears to have been expanding between 1822 (or 1836-37) and 1871 at a rate so high as to be improbable.[6/]

Though the quinquennial counts starting in 1851-52 might have been of a somewhat better quality, they imply erratic and surprising growth rates which raise many more questions than they actually solve.[7/] Some of these rates have been computed and displayed in Table I.1.

To form a judgement about them it may be borne in mind that during the last century an annual growth of the order of 5-15 per 1000 denoted a fast demographic increase whereas 15-25 per 1000 implied an extremely fast increase, never recorded by any region of colonial India. The differential quality of the 1871 census vis-a-vis the preceding ones may be inferred from the spectacular growth of the last five year period.

Although the interpretation of population growth as deduced from the census returns is still an open question, it can be safely assumed that a large, if not major, part of the demographic increase recorded for the pre-1871 period resulted

Table I.1 Annual growth rates for the Tamil districts of Madras Presidency, 1851-71

	1851-56	1856-61	1861-66	1866-71
Chengalpattu	5.6	21.9	34.9	30.8
North Arcot	13.3	8.2	15.4	24.0
South Arcot	24.3	-1.3	22.4	66.1
Thanjavur	-2.3	-0.6	9.4	26.2
Tiruchirapalli	26.5	29.7	14.2	34.8
Madurai	4.1	7.0	9.5	30.5
Tirunelveli	10.8	4.6	20.9	21.5
Coimbatore	3.9	6.5	32.5	47.3
Salem	11.8	32.7	16.2	38.9

Notes: All rates per 1000 of total population
Coimbatore district includes the Nilgiris
Madras town population not available before 1871
Census years before 1871 refer to Tamil Fasli years 1261, 1266, 1271, 1276

Sources: Computed from the Census of Madras (1871, I:9)

from a progressive increase of the areas covered by the population counts, parallel to the better integration of the country within the British bureaucratic structure. The probable level of demographic growth and the relative share of natural accretion and net migration in the districts of the Presidency cannot be ascertained from these census data without a cross-check using further data from an alternative source (the data on land revenue are the first that come to my mind).

When the Government of India asked the provinces to make arrangements for the 1871 Census, Madras authorities were confident in their ability to conduct such a survey owing to the experience gathered by previous counts. The Madras Presidency proved right as it was among the few provinces which could take the census at the scheduled date when many other had to postpone it to the following year. 1871 (or 1871-72) is usually not taken as the baseline of the census history as the census was not synchronous all over India. While studying Tamil Nadu's population, this detail is however of little consequence.[8/] The census reference date is fixed since 1881 in spring, to avoid bad climatic conditions common in several regions of India during the rest of the year (heat, monsoon, snowfall...). It is very often a full moon day to facilitate last-minute operations as the hour of reference is midnight. Care is also taken to avoid days of religious festivals (a somehow impossible task at an all-India level) which may lead to social disruption and artificial migrations towards pilgrimage centres. Table 1.2 indicates the reference dates for the 12 censuses since the first 1871 census in the Madras Presidency. The intercensal period has also been computed and it can be seen that it oscillates closely around ten years with the exception of the first period.

Table 1.2: Census Reference date and intercensal intervals, 1871-1981

Census	Date	Interval
1871	14.11	9.26
1881	17.2	10.02
1891	26.2	10.01
1901	1.3	10.03
1911	10.3	10.02
1921	18.3	9.94
1931	26.2	10.00
1941	1.3	10.00
1951	1.3	10.00
1961	1.3	10.09
1971	1.4	9.92
1981	1.3	--

Note: Interval measured in years

Source: Various census reports; ESCAP (1982:398)

Till Independence, there was no permanent administrative department in charge of the census. Its organisation was entrusted to a temporary structure set up by the Government of India before the census year. It dissolved after the publication of the last census volume, to be reborn for the next census, which caused it to be frequently likened to a comet or a phoenix. However, after the passing of the Census Act in 1948, a permanent organisation was established under the aegis of the Ministry of Home Affairs. The new Office of Registrar General was also entrusted with civil registration and had a regional bureau in each state.9/

The Census work extended over several months. It started with a preliminary house to house enumeration. The house registers were checked at the taluk level and subsequently returned to the enumerator. Once the house listing had been verified, the real work of the census began with the first

enumeration which usually lasted about two weeks; it was the most crucial part of the census during which all particulars of the inhabitants (current residents, excluding temporary visitors) were entered by the enumerator. On the reference day, the enumerators proceeded from house to house to check and update their returns (recent births, deaths or migrations, omissions..). This _de facto_ system of enumeration was however modified from 1931. The floating population (houseless, travellers, wanderers...) was to be enumerated at the final stage only. The forms were then sent through the various layers of the census structure and finally tabulated in Madras.

Since 1871, the government has relied heavily on its civil servants to conduct the census operations. The three main levels of local administration (i.e., district collector, tahsildar and _karnam_, village headman or _munsiff_) represented the infrastructure of census organisation during the data collection periods. In the field, local enumerators were government employees (village _munsiff_, _karnam_...) who were not entitled to any allowance for their extra work. Some enumerators had however to be appointed on the occasion of the census, in particular for urban areas.

This description, inspired from the functioning of the 1871 census, has remained broadly valid in its main outlines till today. There have been of course numerous modifications since 1871. For instance, the census organization schedule has lengthened - due to the incorporation of sample pre-tests, post-enumeration checks .. - and the mode of recruitment of enumerators has changed (they are now mostly teachers). But the sequence of operations has not undergone any radical change.10/

Comparing the first and the last census, it can be observed that the ratio of the population per enumerator remained fairly stable over 110 years of census history : it stood at 441 inhabitants per enumerator in 1871 as against 513 in 1981. But during this period, the census schedule has been significantly enriched by new questions, especially

after Independence. However, the census is no longer as cheap as it used to be during the colonial period, one reason for this being that enumerators are now remunerated for their work. The first censuses in the Presidency were far less costly in relative terms than those conducted in Britain as most early census superintendents never failed to point out.[11/] With the schedule being gradually expanded and the increasing number of tabulations performed, census costs were constantly rising, although the introduction of individual slips in 1901 resulted in a major cost and time reduction (Census of India 1901, XV, 1:4). In 1941, financial considerations prompted the government to put off a large number of tabulations in order to reduce the expenditures involved in data processing. As a result of this war-time budget constriction, the 1941 census volumes contain a skeleton report and a very small number of tables.[12/]

After 1948, the government established a permanent structure for census operations which included also the civil registration system. With the Britishers' departure, the census like other state-controlled institutions became more accountable to the people and its representatives. The better monitoring of the country's demographic evolution was a reflection of the new role imparted by the government to the Census of India. The census was given a new dimension and became a tool to direct and assess political intervention. A large number of new census categories were introduced with a view to identify certain specific social and economic groups. The census was designed to help formulate the developmental policies rather than provide a descriptive picture of the country. But apart from the question on sub-caste, practically no previous question was eliminated from the census schedule and the Census of India preserved its ethnographic character as indicated, for instance, by the lengthy volumes on fairs, festivals and temples published by the Madras census in 1961.

Before proceeding to the discussion of the data made available by the census, a very basic question arises. What did

a cenus mean in last-century south India? It must be kept in mind that the census was a new feature in south Indian history. Before the arrival of the colonial power, no census record has ever been preserved. Our knowledge of pre-British demographic history is not just meagre: it is next to nothing. A well-known historian of south India has only brief comments on the state of the population from the 6th to the 17th century: "There is no means of forming a reliable estimate of the population at any time during the long period which we are now reviewing; even the Cholas, although they kept a minute record of property in land, never thought of taking a census of the population" (Nilakanta Sastri, 1976: 317). There existed a strong tradition of land surveys during the Cholas, continued during the Vijayanagar period, and which might have originated from the time of the Pallavas,[13/] but no population counts.

The census was thus another example of a British-imported institution to India and again it is necessary to reflect upon the origin of census in Britain itself. Although the history of the modern census started only at the end of the 18th century in the west, it was not precisely a new tradition: censuses (census being itself a latin word) had been conducted very often in the past, particularly for military conscription and fiscal purposes, although they were restricted to limited areas and irregular. As mentioned above the census in Britain first appeared in the context of an important intellectual and political debate concerning the population-resource debate to which English economists decisively contributed. At the same time, formal demography was making rapid progress.

The census in Britain must be viewed as a new state institution, the nature of which must be contrasted with other institutions of more apparent repressive character. There is no denying that the census represented a step forward in a broader process of democratisation and individualisation of political control: for the first time, the state enquired directly into the conditions of its people by way of an exhaustive survey of the inhabitants. Compared to other institutions like the armed forces whose main role was that of containing

social tensions, the census exemplified a system of rule characterised by a larger concern of the state for the well-being of its people and by a more frequent tendency to intervene in socio-economic matters. More specifically, the census in Britain was an inquiry into the mechanisms of population growth and the impact on it of economic or social policies. It was, however, complemented by various other sources of information like, for example, the civil registration. The British census being also a thorough survey of the economic and sanitary conditions in the country, it strengthened the idea of the state's accountability to its citizens.

In some sense, it must also have been one of the first aims of the British when they decided to take a census of India, since the rapid growth of the British Empire had triggered in the middle of the last century another political debate, focussing on the profitability of the colonies in a period of seemingly irresistible imperialist expansion. The first Indian census, however, was far less ambitious than the British. It was firstly a mere human stock-taking, meant to provide an exhaustive description of an apparently disordered society. Failure to foresee the developments leading to the Mutiny had been interpreted as a further proof of the rulers' inability to comprehend the Indian milieu and provided additional support among government circles for a large-scale census.

We realize at this juncture that the census, although as an exogenous institution its socio-cultural heredity bore the marks of a political and intellectual climate chiefly alien to India, could easily develop into a bureaucratic instrument of the colonial authorities and acquire in process of time features of its own. But, it is not often easy to tell the genetic factors from the environmental ones. The census was not an indigenous institution which the British had inherited and later on bent to their benefits as can be said of the revenue system. Nor can it be related in vague terms to the progress of science, our knowledge of society and this strange assumption that "all peoples had some kind of population registration".[14/] The census was chiefly a new instrument

of bureaucratic control which assumed the gigantic task of census-taking in a country without statistical tradition. Significantly enough, it never developed into a permanent and distinct organisation of its own during the colonial period and it borrowed most of its staff from the politico-fiscal apparatus; this indicates that census operations retained an ad hoc character in spite of their being repeated regularly. Its budget was also moderate and worked out, on the average, at less than a tenth of the annual expenditures of the Madras police.[15/]

The census had also to evolve its own categories to investigate the state of the population. There was no doubt a great deal of hesitation in the choice of the census questions. Even those which were obviously borrowed from the British census like age had to be reformulated to fit the Indian context. The inconsistencies in the census categories, their formulation and their relevance, prevailing over time, found reflection in the numerous changes undergone by the questionnaire. Similarly, the available tabulations kept changing and, because they were intimately linked to the overall cost of the census, they provide an indirect indication of the variable interests of the census authorities. On the whole, it seems that the original object of the census was of describing the population through an elaborate, but unstable, classificatory grid, with little scope left for a real analysis of the determinants of the social structure. For instance, the detailed classification of infirmities (1871-1931) did little to stimulate the intervention of the state in the health administration of the country. Moreover, the naive combination of objective and socially-determined categories failed to provide a statistically neutral photography of society and the census was before long in a position to stimulate social and political controversies on subjects as various as caste precedence, communal reservations, widow remarriages or consequences of famine.[16/]

1. The focus in this study is on Tamil Nadu and even though many comments apply to the rest of the country as well, materials on which they are based relate solely on sources pertaining to Tamil Nadu or the Madras Presidency.

2. Though China can boast of censuses as ancient as the first century A.D (Han dynasty), the first reliable counts date to the post-revolution era. Japan's first precise census was not taken before 1920. Several other British colonies had their first census in 1871, but very few maintained the decadal tradition. However, 1881 is often regarded as the dividing line for it was the first country-wide census which was exhaustive and synchronous.

3. With the exception of Tranquebar in Tamil South India which was ceded by the Danes in 1845.

4. More particulars on the history of the British census found in Lawton (1978).

5. On the history of the first censuses in the Presidency, see the Census of Madras (1871, I:1-3). In this paper the census references are given in an abbreviated form including the year and the volume and part numbers.

6. Growth rates derived from the Census (see e.g. Dharma Kumar, 1965:105) are of little use for that reason. More reliable estimates have been offered by Bhattacharya (1985:28-29).

7. The instructions for the 1851-52 census were reproduced by the 1871 census (ibid).

8. Except for the parts of present day Tamil Nadu were the first census was taken only in 1875 (Travancore-Cochin).

9. For various accounts of the new organisational structure, see the Census of India (1951, I: iv-v; 1981, 20, II-A: 6-7).

10. Particulars on the enumeration are usually found in a separate volume (Administrative Report) or are included in the Census report itself. To compare the enumeration procedures in 1871 and 1981, see the Census of Madras (1871, I:14-31) and the Census of India (1981, 20, I:3-60).

11. See for example, the Census of Madras (1871, I:71) and the Census of India (1891, XIII: 373). The relative cost of enumeration and processing was more than five times cheaper than in UK. The total cost of the census in the Presidency was originally of 2.05 lakhs in 1871 and reached 6.30 lakhs in 1931. After independence, costs shot up to 36.9 lakhs in 1961 and 68.3 lakhs in 1971. Figures and comments are found in the census reports as well as in the Administrative Report volume (no figure available for 1941 and 1981).

12. A 1% sample (known as the Y-sample) was fortunately preserved and tabulated later in the fifties. It includes important data on age, marital status and occupation (Census of India 1951, paper 8 of 1951 and paper 6 of 1956).

13. See Nilakanta S. (op. cit: 306-307) and Minakshi (1938:60-62).

14. Petrov (1985:32); we find rather surprising this description of the historical context of the first Indian census from an author who is otherwise prompt to charge the colonial system with numerous politically-motivated distortions in the census schedules.

15. Data on the police expenditures are found in Arnold (1986: 101). It may be noted that, owing to the growing political and industrial unrest, the budget of the police department increased faster than that of the census.

16. Cohn similarly argues that "through the asking of questions and the compiling of information in categories which the British rulers could utilize for governing, it (the census) provided an arena for Indians to ask questions about themselves...." (1987:230).

II THE CENSUS CATEGORIES

II. 1 Weird questions get weird answers

The contribution of a census to our knowledge of Tamil Nadu's demography can be assessed through two sets of criteria: on the one hand, the gamut of the available data and their degree of precision and on the other hand, their reliability. We will see that from 1881 onwards, the census offers some of the most crucial data to interpret the population growth, i.e. sex-and age-distributions, marital status and birthplace. Their precision -- definition, tabulation by geographical units and other cross-tabulations--was nevertheless extremely variable in the course of time and this in turn resulted in important gaps in our data base. The constant reorganization of administrative units (taluks, districts and provinces) further hampered the comparability of census data over a long period. Most notable is the lack of data for the 19th century and this problem is tackled separately in Chapter III. As to the reliability of the census figures, it requires a serious assessment before any attempt to interpret the census results. This chapter presents some of the most important data gathered by the census but does not pretend to be exhaustive. It focusses chiefly on the demographic data (age, migration...) and no attempt has been made to investigate the significance of other geographical or socio-economic data (notably the occupational structure).

However, the discussion of each particular class of data entails a more general overview of the census process in order to give to our presentation a broader framework, somewhat reminiscent of the "epistemology of error"

evolved by Gaston Bachelard when he investigated the tortuous progress of western sciences. To understand the nature and extent of the census's shortcomings, it is first of all necessary to examine their causes and how far they are socially determined (random statistical errors belong to a different category).

Let us start again from the genesis of the census. The British were not in a position to take the census themselves and had therefore to rely on their local representatives, chiefly the village accountants entrusted with the enumeration work. The Karnams were more often than not drawn from the higher strata of the rural society, in terms of both their status in the caste hierarchy and their economic conditions. They tended to display some of the biases common to their class and their gender and it led for instance to specific under enumeration (of women, of low caste villagers..) as there were sections of the population which they might have deemed hardly worth enumerating. Remember that the whole idea of a population census was new in last century's south India. The notion of a head-count is based on the assumption that each living person has the same weight and is therefore the basic measurement unit. Although this assumption matches quite logically with a population with strong perception of its individuality like in the West, it may not have been the case with the south Indian population where group affiliation was of more significance. Therefore, the concept of a population as a collection of individuals rather than the combination of variously defined social groups was probably a British-introduced abstraction in south India and till today the spatial concentration of communities in rural area contributes to perpetuate a specific social

perception and interaction patterns which may not correspond to the more atomistic, "democratic" approach of the census.

At the lower level of the household, the (male) enumerator would usually question the head of the family (i.e. a male elder in most cases) about the particulars of each member of the household (or family), which means most information would come indirectly. To give an example, suppose a man were asked about his daughter-in-law. Is difficult to imagine he is in a position to state correctly her place of birth which might be the house of her mother's parents, i.e. in the village of his daughter-in-law's maternal grand parents. The question being asked would certainly not be an easy one. Unless the concerned person is present and allowed to answer, several factual errors are bound to creep in.

But there are several other questions which simply cannot be answered because they refer to categories alien to the perception of the respondent. Age is one of them. It must be kept in mind that in any statistical survey, the questions being asked have been formulated outside the social situation in which they are actually put. To get a "correct" answer to a question requires several conditions. First, both the enumerator and the enumerated must share a common perception of the question, the concepts it uses and ultimately its meaning. Secondly, their understanding of the question must match with the underlying meaning of the question as formulated by the census office. Lastly, there are other intervening factors like the respondent's readiness to give a specific answer to an outsider or the enumerator's inclination to record it properly, which are also indirectly linked to the conceptual contents of the question.

Let me take an imaginary example: the census office wants to know whether this particular woman is "currently married". One fine morning an enumerator duly commissioned for this task (among many others) visits the house where this woman spent her last night. He has already surveyed dozens of households in this poor hamlet, at a stone's throw from the main village, and he wishes he was finished with it. Standing in front of the house, he meets an old man who mentions in the course of the exchange about his daughter (who went to the field early morning). When the father is asked whether his daughter is married (or widowed, or single), he has a doubt: his daughter certainly married few years ago but has returned home after a long series of quarrels with her husband. He has no intention to tell the whole story to this outsider (nor would the latter have the patience to listen to it) But can she be termed an unmarried spinster or a widow? The enumerator and the old man will finally reach a compromise on the answer to be recorded for this question (and several others) which will ultimately find its way in one of the census volumes. The demographer will thus learn years later whether this particular woman is exposed to fertility risk (currently married) or not (widowed, single). This is the tortuous way in which demography reconstructs local facts through its abstract categories.

You may dismiss this example for what it is: a mere piece of fiction. Nevertheless, going through the census reports from the colonial era, you will find a great quantity of examples which look far more puzzling: how a temple's deity was entered in the record with age and occupation, how a mother's age was barely 3 years above that of her son, how an enumerator failed to survey an entire portion of the village. The British census

superintendents were usually very fond of similar colourful examples which gave a touch of exoticism (and disguised racism) to their otherwise sober prose. But the reports contain at times perceptive analyses of the biases caused by the question's formulation and the respondents' and the enumerators' diverging interpretations of it. In recent censuses, these comments have become less frequent and data are often presented without any warning regarding their reliability; the commentator being now part of the society the census describes need not underline distortions (or semantic drift) deriving from a commonly shared world view. This is so only up to a point, for his own interpretative categories which are more or less analogous to the census categories may also clash with those of the rural folk. "Incorrect statements" will then be dismissed as due to the respondents' "ignorance" ("illiteracy" etc.) in accordance with the typical (negative) categories which shape the perception of the urban middle-class about the rest of society.

But beyond the interpretations given by the observers, there is a basic need to go back to the data however distorted they might be. The understanding of the logic at work at the different stages of the data collection is often tentative. Worse: the exercise ends up at times in negative results when it is evident that the census categories have failed to capture the social phenomenon it attempted to. However, the census carries always some information: the next sections endeavour to delineate its extent.

II.2 The quality of enumeration

In 1871, the census of the Madras Presidency covered nearly the whole area of present-day Tamil Nadu, including the autonomous territory of Pudukkottai. The segments of the erstwhile princely states of Travancore and Cochin which were added during the 1950's were first surveyed by the census in 1875. Thus, the geographical coverage has been almost uninterruptedly complete from the very beginning. Yet, this does not imply that the census has always been exhaustive in the enumeration. We have already hinted at the fact that certain sections of the population were more subject to underenumeration than the rest of the population for various sociological reasons. For instance, people might have objected to their female relatives being enumerated, even though purdah-related customs were rarer in Tamil Nadu than in other regions. It was also reported that it was sometimes felt that females or babies did not need to be entered at all during the enumeration. For the same type of reasons, the Harijan hamlets which high-caste people often failed to consider as part of the village unit might have been simply left out of the enumeration. A more practical reason for the exclusion of the low-caste population was also the reluctance from enumerators to venture in the polluting *Cheris* to conduct the survey.

Another section of the population that was likely to be undercounted was the floating population, consisting, on the one hand, of various categories of travellers (including soldiers on march, rail passengers...) and, on the other, of the houseless poor. The reason for this specific underenumeration was chiefly technical, since this population had to be enumerated at the last moment according to the *de facto* procedure. Travellers, however, were not numerous

and moreover, in 1931 and 1941, the census changed to a *de jure* system in which people were to be entered at their place as usual residence. As to the houseless population which could not be included in the house-listing prior to the census, the chances are that it was less accurately enumerated than any other section of the population, as it must have been the case in 1871 (see below). Unfortunately, we do not have the complete series of the floating population (travellers, houseless and institutional population) over the period 1871-1981.

Despite the efforts of the census administration, there remains always a minor part of the population which fails to be enumerated, this being a common feature of every census. A variable level of net omission (i.e. undercount minus double count) is, however, a more disturbing phenomenon. As we have seen, specific groups were most affected, especially during the first census. A still more serious problem arises when the extent of under-registration changes over time and more specifically, when a particular census is marred by unusual under enumeration, for most demographic analyses are based on growth rates and the comparison of successive censuses. An increase in the omission rate during the later census means that a larger number of people have been omitted, and this would be wrongly attributed to higher mortality or out-migration rates. Thus, an omission rate increasing from 0% to 2% between two censuses will artificially depress the annual growth rate by about 2 per 1000. This represents a serious threat to the robustness of the estimation procedures used to compute intercensal vital rates.

Unfortunately, it is extremely difficult to evaluate the differential quality of the censuses. Post-enumeration checks have been conducted only from 1951 for the whole of India and they tend to indicate a very reasonable level of omission which has remained more or less constant as shown in Table II.1. Omission has been generally less pronounced in Tamil Nadu than in the rest of country, except in 1961. It seems that errors reported from Tamil Nadu are more often due to individual undercounts (omission of different persons) than to collective undercounts (entire households missed). It is also observed that underregistration is higher in urban areas (twice the level of rural areas), owing to the housing structure as well as the greater anonymity typical of urban life. More detailed results point to noticeable variations between districts, Madras city being no doubt the least correctly enumerated area.[1]

Table II.1: Census omission rates, India and Tamil Nadu, 1951-81

(per thousand)

		1951	1961	1971	1981
India	Males	9.6	NA	15.3	17.1
	Females	12.2	NA	18.3	18.8
	Total Population	10.9	6.8	16.8	17.9
T.Nadu	Total Population	NA	9.0	12.6	15.1 *

Note : * refers to South India.

Source : Sinha (1982:399) Census of India (1961, IX, I-A(i):17; 1971, 19, I-A:3; 1981, paper 4 of 1982).

No similar data are available for the previous censuses, since no post-enumeration check was conducted before 1951. Whether these checks can really quantify the extent of under-registration, however, remains a moot point as our discussion of the quality of the 1961 census will show. On the other hand, the civil registration's failure to provide reliable estimates for the vital rates which will be described in Chapter III precludes any possibility of comparing the observed intercensal growth with an independent source.

It may not be surprising to notice that the census superintendents have never failed to praise the quality of the census operations in their reports. Their judgements about their own census are expectedly very optimistic and stress the increasing accuracy of the census. Following here are the typical comments of a census superintendent:

"All officers unite in attributing a high degree of accuracy to the enumeration. In this opinion I fully concur and, though a census must necessarily be at best an approximation, I believe the margin of error was smaller in 1891 than in any previous occasion" (Census of India 1891, XIII, 1:362).[2]

What the census superintendents usually meant is that the enumerators received full cooperation from the inhabitants in spite of certain fears regarding the distrust inspired by the census (hidden fiscal purposes) or the anticolonial unrest (especially in 1921 and 1931). These comments are however too vague to allow to reach a precise conclusion on the quality of these censuses. But on the other hand, certain censuses have a bad reputation and have received a number of criticisms. They exhibit characteristics which look atypical and the interpretation of their results is

often problematic. This is certainly the case of the censuses of 1871 and 1961, and perhaps also of that of 1941.[3] The 1871 census which was the first comprehensive census of the Presidency was probably of a somewhat poorer quality than the following censuses for understandable organisational reasons. Specific sections of the population seem to have suffered from a high level of under-registration, especially female and low-caste populations and the census superintendent was rather candid about it.[4] At least in the case of the floating population (houseless poor and various travellers), the 1881 census clearly demonstrated that the 1871 count missed almost 4 lakhs people; the further estimation of the extent of female underenumeration is perhaps less convincing, but a proper assessment of this census is made difficult by the absence of reliable estimates previous to 1871 and the unusual perturbations obtained during the 1871-81 decade (1876-77 famine and population decline).

As to the 1961 census, the first doubts were raised after the preliminary house-listing which showed a surprisingly low growth of 9.1% in Tamil Nadu (then Madras state). The census authorities were immediately worried about a possible underestimation and ordered a full check.[5] A detailed description of the census operations given in the report and the apparently good results of the post-enumeration check (see preceding Table II.1) tend to allay our fears. Yet, the very low growth in 1951-61 remains difficult to explain in the context of rapidly falling mortality rates witnessed every where in India.

Table II.2 Intercensal growth rates in Tamil Nadu, 1921-81

	1921-31	1931-41	1941-51	1951-61	1961-71	1971-81
Inter-censal growth	+8.52%	+11.91%	+14.66%	+11.85%	+22.30%	+17.50%

As can be observed, the growth rate of Tamil Nadu's population tended to increase from 1921 onwards - mainly as a result of a secular mortality decline. However, computations based on the 1961 census imply a sudden decrease of the growth in 1951-61 followed by a rapid acceleration in the next decade. This seems to suggest that the 1961-71 demographic increase was somewhat overstated and compensated for the slow 1951-61 growth. If the variations in the level of registration are held responsible for these atypical growth rates, it can be safely concluded that the 1961 census suffered from an unusual level of under-registration; the possibility of repeated overestimations in 1951 and 1971 is highly unlikely. Other data tend to support the hypothesis that the fault lies with the 1961 census: when computing the overall survival ratio (ratio of the population above 10 years over the total population in the previous census), it is noticed that this ratio declined significantly from 0.882 in 1941-51 to 0.840 in 1951-61 and shot up in the following 1961-71 decade to 0.906. Constant improvements in health conditions in Tamil Nadu contradict this apparent decline in 1951-61.

There are several tentative methods of estimating the actual 1961 population. One is based on the assumption of a regular (linear, exponential) evolution of the growth rate and yields several estimates for 1961 according to the adjustment procedure. These estimates are however relatively close to each other and suggest a population for 1961 ranging from 34.8 to 35.8 million as against the 33.7 million returned in 1961 (relative gap of 3-6%)[6].

A completely different procedure can be followed by using the SRS data presented in another chapter below. From the SRS-based vital rates which are shown to be fairly reliable indicators of the actual rates, the vital rates are estimated by backward linear projection for 1961-70. This method provides estimates for the 1961 population ranging from 35.07 million to 35.28. As no allowance is made for the (out-) migrations, this is probably an underestimate but still very close to the estimates obtained previously.

We have thus seen a probable case of severe underestimation of the total population by the census. Even though it is difficult to come to a firm conclusion as to the exact extent of underregistration during the 1961 census, various estimation procedures indicate that its magnitude was probably not less than 3%. Similar estimations for previous censuses are unfortunately extremely risky owing to the paucity of reliable estimates for the vital rates. Underenumeration is probably bound to remain a recurring ghost frustrating the most careful demographic analysis.

II.3 Sex

Sex determination is certainly not a source of error in the censuses (eunuchs were counted as males, though). Nevertheless one cannot slur over the question of sex-specific underenumeration, an issue which stemmed from the perplexity of the British at the discovery of the low female proportions in the Indian populations (see Fisher & Ifeka, 1984). The census reports initiated very early the discussion on the determinants of sex-ratio in India as they were confronted with a baffling sex-structure, very different from that obtained in western Europe. Although in the Madras Presidency women constantly outnumbered men--unlike in the rest of India-- this issue has haunted the census superintendents. It may have been so simply because the first among them had formulated the awkward hypothesis that low female percentage reflected more a poor female enumeration rather than the actual composition of the population (Census of Madras 1871, I: 10-11). And the first census very probably underestimated the female population as Cornish acknowledged: "In regard to the enumeration, however, it is quite plain that the number of females was put indifferently given in many districts" (ibid: 361).

However, the persistence over years of female deficit in certain Deccan districts of the Presidency (outside present-day Tamil Nadu) discouraged the usual theory of female undercount and the issue was consequently investigated within a broader socio-geographical conceptual framework. At the close of the last century, it can be safely assumed that the sex-differentials in omission rates were to all intents and purposes negligible.

II.4 Age Data

Among the data provided by the censuses, age is no doubt the most crucial one once the total population has been evaluated. For a demographer working on Indian data, age figures are no doubt the most enigmatic ones. But before examining the quality of age reporting in census, we will first review the availability of age data.

Ideally, age data should be given for each census sub-unit (town, district..) in the most detailed classification. But data tabulation is a costly affair (often twice more expensive than the enumeration itself) and age cross classifications were mostly regarded of little use. In next table II.3, we have presented the array of forms in which age data are available in the census from 1871 to 1981. As this table is extremely compact, it requires few explanations. For each census, we have indicated the age-classifications available, ranked by decreasing degree of precision (see left column): it starts with the single year classification and ends up with very crude classifications. Only the most detailed classification is mentioned since other classifications can easily be computed from them. At the same time, the variables cross-classified by age are also indicated; they may be geographical (administrative units) or socio-cultural (religion...). Brackets and asterisks have been added to indicate whether data are from a sample or are smoothed. For instance, the table shows that in 1921 the best age data by district are available only for decennial age groups and cross-classified by civil condition. All the age data have been included in this table, with the exception of the literacy returns which are anyway not particularly detailed. As the reader will notice there are no less than 17 different age classifications for the 43 tabulations reported in the table, each of which is available by sex.

Table II.3: Age Data in the Census, 1871-1981

	1871	1881	1891	1901	1911	1921	1931	1941	1951	1961	1971	1981
Single year	MP*	MP*	(MP)	(MP)	(MP)	(MPxR)	-	(D)	(D)	TN	TNxRU	TNxRU
Quinquennial groupings												
0.5.10...70+											DxRU	DxRU
0.1.2.3.4.5.10...70+					CCxR	CCxR	CC*	(DxCC)		D		
0.1.2.3.4.5.10...60+		DxR	DxR	CCxR								
0.5.10...60+	D		DxCC				DV*					
0.10.15.20...70										DxCC	DxRUxCC	DxRUxCC
Decennial groupings												
012345.10.15.20.30...60+						DxCC	DxCC*					
0.10.15.20.25.30.40...60+		DxRxCC										
0.7.13.20.30...60+	DxR											
01.5.15.25...75+									(DxCCxRU) (DxW)			
Other groupings												
0.5.10.15.20.40.60+				DCxCCxR	DCxCCxR		DV,R					
0.5.12.15.20.40+				CCxJ	CCxJ	CCxJ						
0.6.13.17.24.44+							CCxJ					
0.5.10.15.20.30.45+										DxSCT		
0.10.15.40+			CCxJ									
0.15.45+											SCT	
0.5.15+			W									

Abbreviations used:

(-): sample data
*: smoothed data only
CC: civil condition
D: district
DC: district and city
DV: provincial division
J: selected jatis
MP: Madras Presidency
R: religion
RU: rural/urban
SCT: scheduled castes and tribes
TN: Tamil Nadu
W: occupation
x: cross-classification

Notes: 01.5.15.25.75+ reads as 0yr, 1-4yrs, 5-14yrs, 25-34yrs, 35-44yrs...65-75yrs, 75yrs and more.

This table illustrates the hurdles resulting from the ever-changing classifications of age used by the census in Tamil Nadu. We do not have a complete series of single year data from 1871 to 1981, even for the whole province. Nor do we possess a continuous series of district quinquennial ages over the same period.

Some data, notably for 1941 and 1951, are drawn for a sample but this may not constitute a serious source of trouble. This is not so when smoothed data are not accompanied by the relevant raw data. These smoothed data (on the smoothing techniques, see further below) are certainly convenient for rough, non-demographic estimates, but they tend insidiously to completely obliterate the characteristics of the age-distribution due to the past variations of the vital rates. Smoothed data stand in the same relation to the raw data as rasam powder does to the original recipe: useful, handy replicates that have lost some of the original flavour in the process of standardisation. Specialists would remain skeptical.

As if that were not enough, the census itself vascillated in its own definition of age. When age was usually (supposed to be) stated in number of completed years i.e. age at the last birthday), 1871 and 1931 censuses attempted different procedures whereby age would be recorded respectively as the age at the next birthday and the age at the closest birthday. 1931 data having been sinfully smoothed afterwards, the reconstruction is extremely difficult in the absence of the unsmoothed figures. The data for these two censuses are examined further below in this chapter. It must be noted that these classifications which were intended to take into account the usual formulations of age in Indian languages resulted in a total confusion.[7] But, as remarked in the last census report, this is not where the main problem with age lies:

"All the niceties about the definition of age appear to be hardly of any consequence, when a majority of ignorant population of our country is not able to return their ages correctly even to the nearest decade" (Census of India 1971, 19, I-A:116).

Nor is the problem new. Every census report had approximately the same comments on the reliability of the age data. Here follow two examples drawn from the colonial censuses of the Presidency:

"All inquiries in regard to age of an Indian population must be necessarily unsatisfactory. Even supposing the people to be willing to give information on such a subject, they are so ignorant of their real ages that any statistics framed on the results of such an inquiry is must be approximate only" (Census of Madras 1871, I:86).

"Essentially, however, the age question at an Indian census remains a groping in the dark" (Census of India 1931, XIV, I:99).

Age represents a very abstract question in the Indian context as most of the population does not know its (chronological) age. No doubt, age stands as a typical western category. Only a tiny, westernized section of the population keeps record of its age and, for instance, celebrates birthdays. It was observed to me rather cynically that it was the death anniversary which was commemorated rather than the birthday as if death was more sacred than life in India. Although astrology has long been practised in India and facilitates the estimation of age, it is mostly restricted to the higher castes (Brahmins acting often as timekeepers of the society) and moreover

used only for isolated occasions in the course of life. Usually, the day and the month (whatever the calendar used) of birth may be remembered, but it seems that the year is of much less importance. Nowadays, age remains by and large an alien, irrelevant category imported from the West, though for a growing proportion of the population, bureaucratic interaction has meant a more pronounced age-consciousness.

This does not mean that human life is perceived as an undifferentiated continuum in rural society. There exist various indigenous categories dividing the span of life into more or less clear-cut categories. The best known of these are the stages of life (ashramas) from the Great Tradition and other ritual stages (rites of passage) observed mainly among the higher castes. Greenough (1982:245ff) has elegantly explained some of the features of famine mortality in 1943 Bengal by invoking local life-stage categories; but at the same time, his statistics are founded on biological age as inaccurately reported by censuses and surveys.

Now, let us examine the process by which age is returned in the census. Supposing a person ignores his/her age or is not present when the enumerator visits the household. Age has to be estimated by various methods. The most accurate one consists in comparing the date of birth to other events the date of which are otherwise known. It can be for example the age of other members of the family, but the latter are likely to ignore their age too. A more reliable technique consists in estimating age by using a calendar of local events (political events, natural calamities...) serving as reference. Although the method is suggested by the census, it is however a tedious, time-consuming procedure and the quality of the age data examined further below indicates beyond doubt that it was but seldom employed.

The commonest way to estimate age is in relation to the life cycle as divided in local categories of life-stages : weaning, puberty (or rather menarche for girls), betrothal, marriage, first and last children, birth of grand-children are the main demarcation points in the life-cycle. Note that they vary with the sex of the concerned person (with the probable exception of weaning) and the year of the census for these biological or social stages have not remained static over 100 years. Note also that they correspond but imperfectly to specific biological ages; for example, age at marriage during a specific period may vary between individuals and between social groups. The estimation performed by the enumerator consisted thus in a quick evaluation of the concerned person's position in the life cycle based on physical appearance and details obtained from the family. As marked events in the life-cycle become rarer with increasing age, witnesses less numerous and duration from birth less easily estimated, age accuracy tends to deteriorate quickly for older people.

When finally the enumerator enters the age on the census schedule, he has to opt for the rough "guesstimate" obtained after his survey. These figures are necessarily round and the age-distribution exhibits a strong attraction towards certain numbers, especially regarding the last digit. In such a case, given the numerical characteristics of human anatomy, multiples of 5 and 2 tend to be favoured. Therefore, 0 and 5 are in this order the preferential digits returned in the census, followed by odd numbers 2 and 8 which are the most remote from 0 and 5. Similarly, 6 or 4 follows, and then 3 or 7 and finally 9 or 1 which are rarely used owing to the attraction of 0. These

hypotheses are statistically confirmed by the use of Myer's index of digital preference which measures the respective attraction of each digit.[8]

The results shown in table II.4 are based on the raw single year distribution available for the province or the division corresponding to Tamil Nadu. The index has not been computed for smoothed data in 1871 and 1881. It must be also mentioned that the 1901 age distribution of males has very probably been partly smoothed, a fact left unmentioned in the census report, for it displays a typical feature of satisfactory male age-reporting.

Table II.4: Index of Digital Preference, 18911981

Year	1891		1901		1911		1921		1941		1951		1961		1971		1981	
Sex	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Myer's Index	100	110	37.4	92.2	80.9	90.3	97.5	102.1	82.9	88.9	57.4	64.3	70.5	81.3	52.8	60.1	61.0	69.1
Digital prefere-nce in(%)																		
0	43.8	50.0	19.8	38.0	37.8	43.1	42.3	46.2	34.6	37.9	25.8	28.6	28.7	32.7	23.5	26.0	25.3	28.0
1	1.6	1.3	9.8	4.0	3.6	3.4	2.5	3.3	2.8	2.2	5.3	4.8	3.4	2.5	5.1	4.1	5.5	4.1
2	7.0	6.5	9.2	7.7	8.8	8.2	7.0	6.1	9.1	8.6	10.0	9.4	8.9	8.0	10.0	9.4	10.4	9.5
3	2.6	2.1	8.0	3.6	3.4	2.9	2.5	2.3	3.8	3.3	5.5	5.1	4.7	3.8	6.4	5.6	6.2	5.3
4	3.7	3.0	7.9	3.6	5.1	4.5	3.5	3.5	3.9	3.7	5.9	5.8	4.1	3.4	5.3	4.8	4.5	4.0
5	26.2	24.5	18.9	28.1	22.6	22.0	26.5	24.9	26.9	26.5	22.8	23.5	26.5	28.6	22.9	24.0	24.8	26.5
6	4.9	4.0	7.0	3.1	6.5	5.3	5.1	4.7	5.3	5.2	6.3	5.8	5.5	5.0	6.4	6.2	5.5	5.4
7	2.4	1.9	6.5	4.8	3.1	2.7	3.2	2.5	4.1	3.4	6.8	6.2	6.9	5.8	6.9	6.3	6.7	5.9
8	6.2	5.3	6.7	4.2	6.3	5.5	5.4	4.8	7.2	7.0	7.0	6.7	7.5	7.6	8.6	9.0	7.5	8.1
9	9.0	1.4	6.2	3.0	2.7	2.2	2.0	1.7	2.4	2.1	4.5	4.1	3.8	3.2	4.9	4.6	3.6	3.2
Age-aware-ness in(%)	15.9	12.7	61.6	29.6	27.1	22.1	19.8	16.8	24.0	21.3	45.3	41.2	34.0	25.0	49.0	41.0	36.0	31.6

Notes: -raw data not available for 1871, 1881 and 1931 censuses
-1901 data for males most probably smoothed
-for explanation on the indices, see text.
-1891-1931: Madras Presidency; 1941-51: South Madras Division; 1961-81: Tamil Nadu

Sources: Computed from correspondding census data, except for 1961 and 1971 (Census of India 1961, paper 2 of 1963; 1971 paper 3 of 1977.)

The quality of age-reporting has definitely improved since 1891, but the trend albeit globally downward has been hesitant as can be seen from the Myer's index which sums up the average distortion for all the digits. This index theoretically varies between 0 (no attraction) and 180 (complete concentration on a single digit); it decreased from more than 100 in 1891 to 50-70 in 1971 and 1981. But this reduction was by no means a regular one and it can be assumed that the value of Myer's index is partly determined by the overall quality of enumeration, apart from the increasing awareness of age. Thus, we cannot fail to notice that the Myer's index recorded a significant rise in 1961 (compared to its value in 1951 and 1971), which confirms our suspicion about the accuracy of this census.

To give an idea of the proportion of the population aware of its age, we have evolved a very simple index shown at the bottom of the table. We first identify the digit least favoured (usually 9) and further assume that people who have returned this digit have done so because they actually knew their exact age. Had they not known it precisely, they would have selected some of the more attractive other digits. The proportion of this digit is say of 3.16% for females in 1981 whereas it should be very close to 10% in case of perfect age-reporting: thus we can infer that 31.6% of this population know its age and we may reasonably extend this estimate to the whole population.

This method shows that age-consciousness has progressed but very slowly with less than a third of the total adult population being aware of its age even today as against about 15% in 1891. This may be related to literacy which progressed from 13% in 1891 to 53% in 1981 among adults[9], but it seems that the proportion

of illiterates has increased faster. This in turn indicates that a noticeable proportion among the literates cannot state its exact age. Actually, even though both literacy and age-awareness are no doubt linked in statistical terms[10], the relation is far from being straightforward.

Present-day India is often conceived of as a two layer-structure comprising two well-differentiated segments, each characterised by distinct cultures, socio-economic positions and access to material and other benefits. Illiteracy is obviously a feature typical of the bottom structure and tends to reinforce the social marginality of its members vis-a-vis the global system. But age misreporting cannot be simply viewed as a function of illiteracy; both are rather different aspects of a broader phenomenon of low social integration within the frame of a "modernising society". That the relation between literacy and age-consciousness is somewhat loose is best exemplified by sex-differentials. Whereas in terms of literacy there exists a huge gap between both sexes, the difference in the level of age misreporting turns out to be proportionally narrower. For instance, the male-female difference in the estimated proportions of people aware of their age is in the order of 3.9 per cent over 1891-1981 whereas the present gap in literacy between the sexes is more than 30%. This means that women tend to know their age relatively well even though access to formal education is denied to the majority of them.

Quinquennial age data

In view of the severe distortions of the age distribution by single year of age, it is practically impossible to use

it to estimate past variations in the birth rates. Separate generations born in different years tend to get mixed with adjacent generations and redistributed according to specific digital preferences. It is far more preferable to use a five-year grouping, in the hope that the redistribution operates within a small age interval and that most concentrations on round digits 0 and 5 will disappear. This is partly true and quinquennial age-distributions are significantly more regular than single year distributions. Strong attraction towards 0 (especially for older censuses) tends nevertheless to distort the age-structure as we will see below.

Census superintendents have often resorted to smoothing in order to level off the erratic age-distribution. Various methods are used, some based on simple moving averages, others using more sophisticated quadratic fittings (difference methods). The truth about them is that any smoothing procedure, if iterated several times, will yield a good-looking, smooth distribution without peak or trough. But these techniques are not only arbitrary in that they treat age-repetition as a statistical distribution of supposedly regular (linear, quadratic...) values; they are also dangerously reductionistic since they erase all actual irregularities of the age-structure which are precisely due to demographic factors, the accidental decrease of natality during demographic crises being the most classical example of such irregularities. It is for example impossible to distinguish the effects of the 1876-78 famine on the 1901 smoothed age-distribution, whereas it is apparent on the quinquennial raw data from the same census. Combined with the redistributive effect of age misreporting, smoothing effectively suppresses most of the traces of past demographic fluctuations and therefore is better avoided in any demographic analysis.

Table II.3 presented above shows that most censuses offer quinquennial age-distributions at a district level. These are precisely the data from which Tamil Nadu's age-distribution will be estimated for the periods prior to 1961. The procedure is reasonably simple: each district distribution is weighted according to its contribution to Tamil Nadu's total population[11] and the weighted total yields the age-distribution for Tamil Nadu in its present boundaries. However, this procedure requires some adjustments for the censuses which do not provide the 5-year classification of raw age data. That is the case in 1871, 1901, 1911, 1921 and 1931.

1871 stands apart, as age was then returned as the age of next birthday (Census of Madras 1871, 1: 24). Moreover quinquennial groupings used in the census are vaguely defined as "0 to 5", "5 to 10", "10 to 15" (...) which is to be understood as "not exceeding 5", "above 5 not exceeding 10" (etc ...). It would thus seem that we have 5-year groupings like 1-5 years, 6-10 years (...) which match with the usual ones (0-4 years, 5-9 years ....) as age is taken at next birthday in 1871 instead of the usual last birthday. Unfortunately, due to concentrations on round numbers, this shifting of age has serious consequences. For example the group identified as 46-50 years in 1871 is supposed to refer to the actual 45-49 years; but the tremendous attraction of age 50 causes this group to be severely overestimated whereas in all other censuses, it is the following 50-54 age-group that is overestimated. In order to allow comparisons, it has been deemed necessary to correct this deviation from the usual pattern of age-distortions. We have used the earliest raw age-distribution available by single year of age (1891) and computed the value of different age-segments denoted by:

$[0, 5[_{91}$, $[5, 6[_{91}$, $[5, 10[_{91}$.
(read respectively 0-4, 5, 5-9 for 1891).

From these values, the ratios

$$[5n+1, 5(n+1)[_{91} \;/\; [5(n+1)+1[_{91} \quad \text{and}$$

$$[5(n+1), 5(n+1)[_{91} \;/\; [5n+1, 5(n+1)+1[_{91}$$

have been derived and applied to 1871 data to disaggregate the quinquennial age-structure. For instance, $[46, 51[_{71}$ is split into $[46, 50[_{71}$ and $[50, 51[_{71}$ in order to isolate the proportion returning 50. Thereafter, groups are reconstructed by adding adjacent segments:

$$[50, 55[_{71} = [50, 51[_{71} + [51, 55[_{71} \quad \text{etc.}$$

The age structure obtained by this procedure displays roughly the same irregularities as that of the 1881 for the Madras Presidency.[11] The results are shown in the second appendix to this paper.

In the case of the census figures for the period 1901-1921, the procedure consists in splitting up each 10-year or 20-year broad age groups (for the districts) by using coefficients from the quinquennial age distribution of the Presidency. This procedure was followed by Mukherjee (1976) and the Census of India (1961, IX, II-B (i). This is however not applicable to the 1931 data because the only quinquennial age distribution available are smoothed. A first work by Agarwala (1967) endeavoured to "unsmooth" the published age structure, but it was subsequently improved by Mukherjee (1976:25-36). The age-structure has retained a somewhat regular pattern showing that unsmoothing was at best partial.

We have used in our analysis the estimates provided by Mukherjee for 1911-61, except that the total population has been corrected due to a minor default for 1911. For 1871-1901, the data have been assembled from district figures and, for 1971 and 1981 they stem directly from the census volumes.[13] The age structure for Tamil Nadu over 1871-1981 is given in the second appendix. Note that from 1941 onwards, detailed data are available for the 60-64 and 65-69 age-groups. The following table recapitulates the sources and methods of estimation.

Table II.5 Quinquennial age-structure for Tamil Nadu, 1871-1981

Census years	Sources	Corrections if any
1871	District figures	District weightage and age correction
1881-91	do.	District weightage
1901-21	do.	District weightage and disaggregation
1931	do.	Unsmoothing by Mukherje (1976)
1941-51	do.	District weightage
1961-81	State figures	

The quality of the quinquennial series has been tested with the help of the United Nations indices which examine the regularity of the age-distribution for each sex as well as that of the sex-ratio[14]. These values are shown in table II.7. As the analysis of single year data has already shown, the accuracy of age data in Tamil Nadu has greatly improved after 1921 (low 1931 scores are due to the partial smoothing). Actually, the improvement was probably more gradual than it appears since 1901-1921 data have been reconstructed by using the whole of the Presidency whereas Tamil Nadu most probably had more accurate data than the rest of the Presidency[15]. In spite of the improving age-accuracy of Tamil Nadu's age data, the U.N. scores remain rather high and hardly satisfactory.

Table II.6 Indices of age accuracy, Tamil Nadu, 1871-1981

	1871	1881	1891	1901	1911	1921	1931	1941	1951	1961	1971	1981
Age-ratio score												
Males	14.9	12.1	10.0	22.3	14.3	17.4	7.2	5.6	6.1	5.2	6.3	4.7
Females	27.5	22.5	20.8	32.8	24.1	27.7	7.9	6.8	6.4	7.0	7.7	7.5
Sex-Ratio score	15.4	14.3	14.6	14.3	12.2	13.4	5.3	6.7	4.7	4.7	5.2	4.3
Joint score	88.6	77.6	74.5	97.9	75.1	85.3	31.0	32.4	26.6	26.4	29.8	25.0
Joint Score (All India)	-	94	85	80	80	79	45	50	38	38	35.7	35.8

Note : The joint score is derived by adding three times the sex-ratio score to the sum of the two age ratio scores.

Source : Computed from Tamil Nadu's age data; scores for India taken from Mukherjee (1976) and the Census of India (1971, paper 3 of 1977; 1981 paper 1 of 1984).

Sex disparities have slightly reduced over the years, but the gap was rather high during the last census compared to 1971. For urban zones (results not shown here), the age-ratio scores are clearly lower than in rural areas, but the sex-ratio score has a higher value owing to the disturbing impact of male migrations towards the towns.

Analysis of the age-structure

Our understanding of the distortions visible in the age-structures requires a more detailed analysis of their evolution over the census periods. A first point must be noted: under a regime of roughly unchanging fertility, a population's age-structure does not undergo sizeable transformations in relative terms. More generally, even during a period of downward mortality trend, the age-structure varies little if mortality remains at the same level.[16] The age-structure pattern is essentially determined by fertility rates, and only marginally by age-specific mortality rates. Evidence for this stems from a statistical and graphic analysis which will be restricted to the age-repartition over the 1881-1961 period. The three other censuses (1871, 1971 and 1981) stand apart for several reasons: 1871 age-structure albeit adjusted for its specific age-definition, exhibits a steep slope between age-groups 0-4 and 15-19 which is highly problematic[17]; most probably, the first age-group has been overestimated. The last two censuses of 1971 and 1981 followed the onset of a sizeable fertility decline and therefore their age-structures have undergone significant changes in the younger age-groups.

The age-structure over 1881-1961 has been examined through a simple statistical analysis. For each age-group,

given in relative terms, the mean and the standard deviation have been computed. Table II.8 which contains the result of this analysis indicates that the relative variation has been extremely modest, with age-groups below 45 recording fluctuations in the order of 3 to 7% around their mean value. Other age-groups display more erratic variations mainly because of the improved age reporting which resulted in less concentration on round ages 50 or 60. Coefficients of variation for the female average age-structure (not shown in the Table) tend to be slightly above those for the male population for ages above 25.

Table II.7 Average Age-distribution, Tamil Nadu 1881-1961

	1881-1961 Average (per 10,000)			Coefficient of variation (percent)
	Males	Females	Total	
0-4	1344	1355	1350	6.78
5-9	1333	1319	1326	5.00
10-14	1181	1080	1129	6.50
15-19	873	819	846	5.32
20-24	784	900	843	3.64
25-29	805	881	843	3.89
30-34	756	804	780	7.76
35-39	650	592	621	7.19
40-44	615	612	613	7.37
45-49	441	400	421	11.63
50-54	432	446	439	7.87
55-59	244	219	232	15.71
60-64	254	263	258	3.69
65-69	125	123	124	3.60
70 & +	169	181	175	6.19
Total	10005	9993	9999	-

Notes : Coefficient of variation computed from the total population
Age groups above 60 available only for 1941-1961

Sources : Computed from the age-distributions

Before carrying further our analysis, it may be worth stressing that the mean age-structure is chiefly determined by the trends of the vital rates over the concerned period. However, the mis-statement of ages contributed also to its specific shape in as much as the pattern of distortion remained roughly stable over the censuses and resulted in similar deformations. For instance, the specific attraction of round ages 40, 50 and 60 is noticeable. Equally disturbing is the fact that the mean size of the age groups is not a monotonously declining function of age as it should be. But it would be difficult to sort out the respective influences of demographic phenomena and age misreporting without comparing the mean census age-structure with what it ought to be (were ages correctly returned). The actual age-distributions are of course unknown.

But as the structures of the population have not undergone important transformations over the concerned period, the mean age-structure can be fruitfully compared to a theoretical age-distribution. For that purpose, we have computed two populations under various assumptions. The first model is simply a "stable" population;[18] the stable population depends on two parameters chosen among various indicators of mortality (death rate, life expectancy), fertility (birth rate, gross reproduction rate[19], growth (natural increase or "intrinsic growth rate") and age-structure (cumulated age-proportion...). The most reliable ones are the growth rate and the life expectancy at birth: the growth rate used is simply the average natural increase over 1881-1961[20] and the life expectancy is taken as 30 years[21]. The stable age-distribution is computed from the standard mortality tables by Coale and Demeny (1966)[22] and it may be interesting to note that it corresponds to a gross reproduction rate of 2.74 female

births per woman (birth rate: 44.2 per 1000), a level significantly lower than in the rest of India.[23]

As it was felt that the condition of perfect stability was not met by Tamil Nadu's population over 1881-1961 and that this could lead to an over-simplification, a different estimate has been arrived at by simulating the population increase from 1871 to 1961. For this purpose, we have estimated for each decade the life expectancy at birth (expressed by age-specific mortality rates taken from Coale and Demeny's female standard life table, west regional pattern) and for each five-year interval the gross reproduction rate (further split into age-specific fertility rates by using a schedule derived from old NSS data). Using the corresponding mortality and fertility rates, the population has been projected from 1871 to 1961 by 5-year steps yielding hypothetical age-distributions for each census from 1881 to 1961. The final result is the mean simulated population computed as the average of the simulated age-structures from 1881 to 1961. The assumptions about fertility and mortality shown in table II.9 have been inevitably approximate but care has been taken to obtain decennial growth rates close to the estimated rates of natural increase, except for the 1951-61 decade for which the natural increase (based on census figures) is understated (see Table II.10). Various sets of estimates were used to improve the model but they failed to yield results different from those obtained in the final version shown here.

The next two tables indicate first the hypotheses on which our simulation is based and second the resulting simulated growth rates as against the corresponding natural increases. Note that growth rates and natural increases do not tally perfectly, which would have simply required more decimals in the estimates of the gross reproduction rates or the life expectancies. Interestingly enough, the coefficient of variation for the simulated age-structure is greater than that of the census age-structure, which signified that our simulation tends probably to overemphasize the actual demographic fluctuations.

Table II.8 Hypotheses followed in the simulation procedure

Five year period starting with	1871	76	81	86	91	96	1901	06	11	16	21	26	31	36	41	46	51	56
Life expectancy at birth	22	22	29	29	27	27	28	28	24	24	29	29	31	31	34	34	38	38
Gross Reproduction Rate	2.9	2.3	3.1	3.2	3.1	2.9	2.9	2.8	2.8	2.6	2.7	2.8	2.7	2.7	2.7	2.6	2.7	2.7

Table II.9 <u>Inter-censal simulated growth rates and natural increases</u>

	1871-81	1881-91	1891-1901	1901-11	1911-21	1921-31	1931-41	1941-51	1951-61
Simulated growth rate	-1.01	15.71	8.29	10.08	4.26	11.75	11.99	14.44	19.20
Natural increase	-1.09	17.08	9.85	11.37	4.74	11.47	12.62	15.82	13.99

<u>Note</u> : rates in percent

<u>Sources</u> : -Growth rates: simulation
-natural increase: estimated by the author.

Both methods have their drawbacks since they are based on theoretical simulations. They share a similar defect in that both rely on a single mortality pattern (female west standard) which was derived from mortality estimates based mainly on the experience of western countries. It might be the case that other mortality patterns provide better fits of the south Indian mortality schedule, but the lack of robust mortality data for the Indian Subcontinent prior to the SRS findings precludes any further investigation of this hypothesis.[24] Life-tables derived recently for South Asia by the United Nations start with a life expectancy at birth of 35 years and are therefore of no help here. But whatever the criticism which both procedures may attract, it is worth noting that they provide very similar age-structures. Table II.10 which gives the stable age-distribution and the mean age-distribution of the simulated populations indicates that variations between them are practically negligible so that there seems hardly any need for distinguishing between the two in our analysis.

Table II.10 <u>Age-distributions, simulation and census data</u>

	Stable (1)	Simulated (2)	Average (3)	Variation (3)-(2)
0-4	149.2	147.4	135.0	-12.4
5-9	121.9	124.2	132.6	8.4
10-14	110.5	107.8	112.9	5.1
15-19	100.7	101.2	84.6	-16.6
20-24	89.4	87.6	84.3	-3.3
25-29	79.2	80.4	84.3	3.9
30-34	69.4	68.5	78.0	9.5
35-39	60.3	61.6	62.1	0.5
40-44	52.0	51.4	61.3	9.9
45-49	44.5	45.7	42.1	-3.6
50-54	37.3	37.5	43.9	6.4
55-59	30.2	31.2	23.2	-8.0
60-64	23.0	23.0	25.8	2.8
65-69	16.0	16.3	12.4	-3.9
70 & +	16.9	16.3	17.5	1.2
Total	999.9	1000.1	999.9	-

Notes: Figures in per 1000

(1): Stable female population, West mortality pattern, growth rate = 10.5p.1000, life expectant at birth of 30 years.

(2): 1881-1961 average of simulated age-structures

FIGURE 1: AGE—DISTRIBUTION, TAMIL NADU

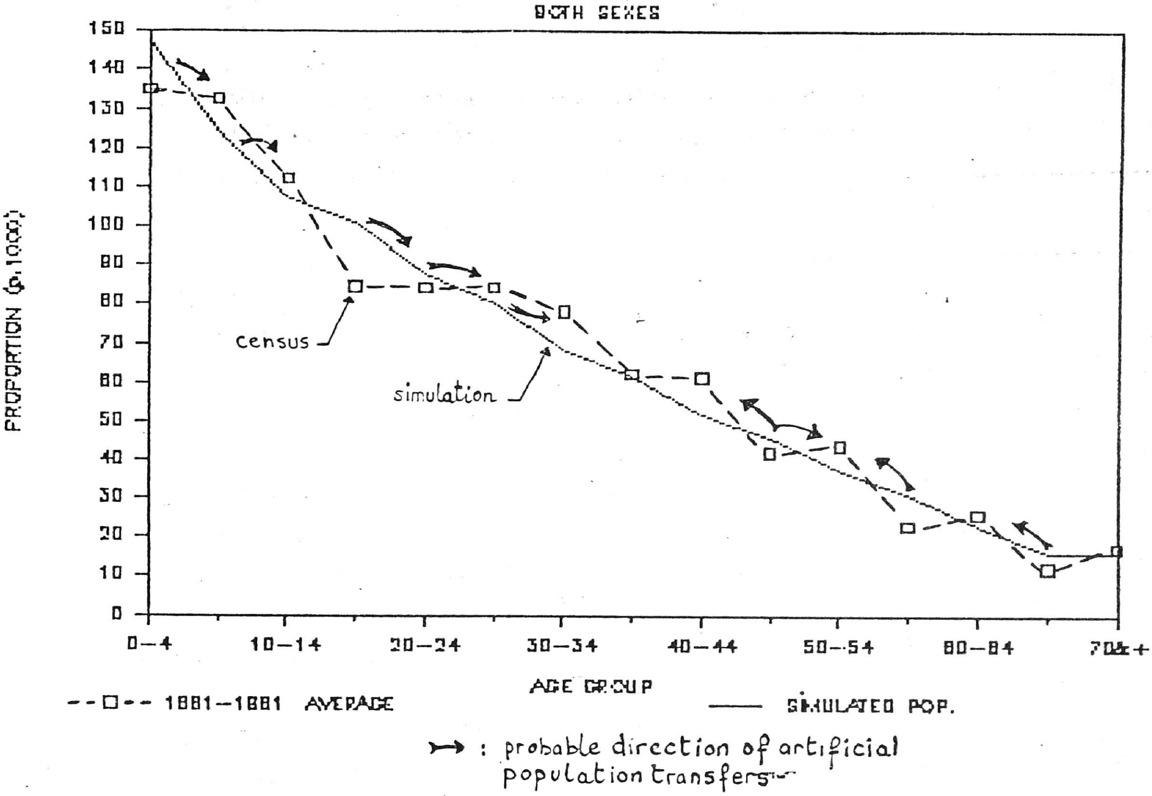
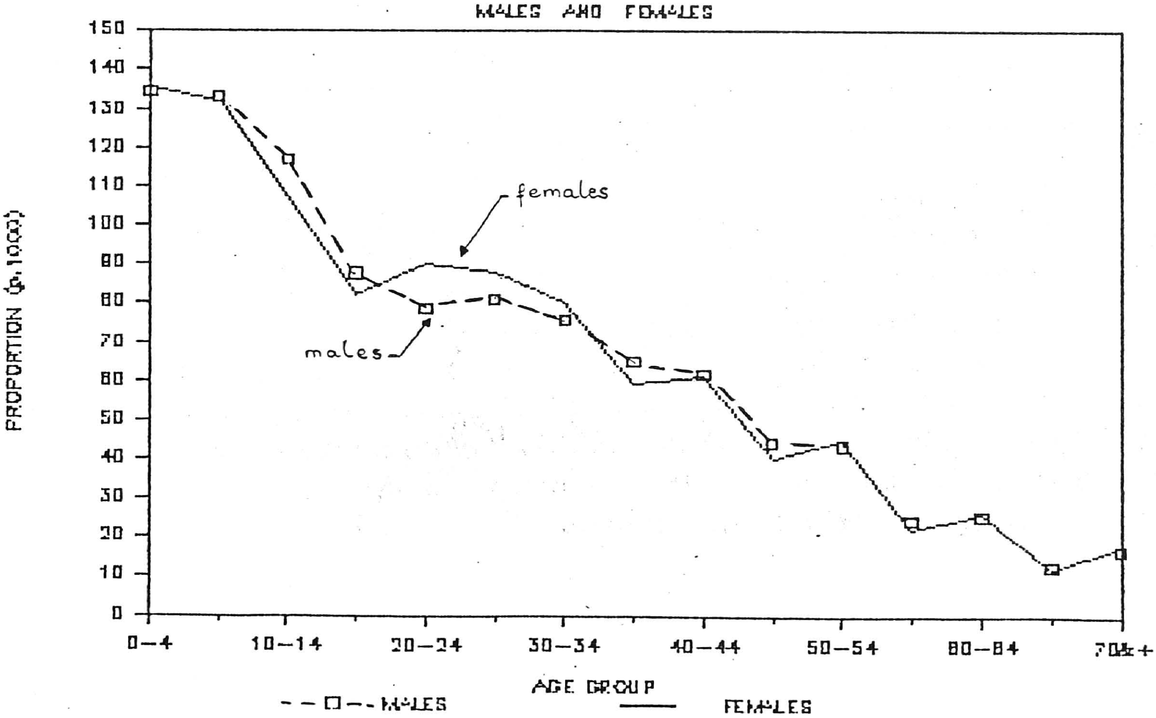


FIGURE 2: 1881—1961 AGE—DISTRIBUTION, TAMIL NADU



In the same table, the simulated age-structures are contrasted with the census average age-structure. The differences between them are determined by three distinct factors:

1. Mortality pattern: West pattern vs Tamil Nadu's experience
2. Impact of (out) migration
3. Age misreporting.

The first factor's impact is likely to be restricted to the first age group. The impact of the second factor is less easy to assess: age-specific migrations have certainly contributed to the relative depletion of the 15-29 age group, in particular for men.[25] The third factor is obviously in sizeable, artificial transfers from certain age groups to the adjacent ones. Figure 1 on which the mean age-structure for both sexes has been plotted against the simulated age-structure allows us to delineate the pattern of these distortions. As we are using only mean 1881-1961 age-structures, the discussion below refers solely to "the regularities of the irregularities" and cannot be a comprehensive analysis of distortions exhibited by each census age-structure.

We may first note that rearranging the data into larger age groups shows the age-distributions to be less divergent. For instance, the proportions below 15 are very close and so are the proportions below 39.[26] In other words, it may be assumed that three broad age-groups have been relatively well estimated by census: 0-14 years, 15-39 years and above 40. Consequently, age misreporting will be analysed mainly as if it had taken place strictly within each of these broad age groups.

The first quinquennial age group appears to have been systematically underestimated. The main reason seems to be age overstatement with the probable shift of children from the 0-4 age group to the next one which in turn is distinctly overestimated. As the age of the children can be most easily computed by reference to other recent events, it is rather starting to observe that the population below ten is so poorly estimated. On examining the single year data available for the Presidency of Tamil Nadu, it appears that age 1 was not often returned. It generally represents less than 80 per cent of the average value of the adjacent ages 0 and 2, but that proportion is at times still lower (in 1891, it is less than 50%). At the same time, the adjacent age do not seem to have benefited from symmetrical transfers.[27]

To understand this curious underrepresentation of age 1, it is necessary to go back to age formulation. The common European usage is to count the age in completed years from the birth. This is called exact age and it starts with 0. Another system consists in counting the running age, i.e. the number of years of life since birth. Age is then expressed as "running age x". "starting age x" (...) i.e., the age at the next birthday. It starts with age 1 (first year of life) and it is equal to exact age plus one. This is the most usual formulation in Tamil as well as in other south Indian languages.[28] The census superintendents tried to remedy it by alternative definitions of age (in 1871 and 1931) with dubious results for a demographic study. In other years, enumerators were supposed to enter the exact age but the concentration on round ages proves that they did not correct the stated age (in running years); otherwise, the concentrations would be on ages 39, 49, 59. But with children, there was a

great risk of very few babies being given age 0 and therefore the census specifically stressed that infants below one should be entered as aged 0. There comes the problem of exact age 1. This is the first age for which corrections from running age to exact age were no longer done systematically. As a result it is a depleted age group since those who are "completing 1" (infants) are given exact age 0 whereas very few among those "completing 2" (exact age 1 year) are correctly returned as aged 1. The effect is a global overstatement of age by one year due to the running age system. But this starts with (exact) age 1 misreported as 2: consequently the population aged one is underestimated and so is the first quinquennial age group[29].

Thus within the first broad age group, the population below 5 years tends to be underestimated and the rest of the age group symmetrically overestimated[30]. Among young adults aged 15-39 years, the influence of outmigration is obvious: not only is this population likely to be away at the time of the census (working in Bombay or Rangoon...) but the mobile character of this age group renders it more liable to be missed by the census. This is particularly true of men whose proportions in the data are lower than those for women. Age misstatement is also at play for the flat appearance of the age-structure from 15-19 to 25-29 cannot be explained simply by migration. It seems probable that there exists a general tendency to overstate one's age resulting in the very moderate slope of the age curve between 15 and 39 years.

After 40, the attraction of round ages 40, 50, and 60 becomes prominent with a sequence of peaks and troughs (relative extrema). This tendency is slightly more pronounced for women whose ages are recorded in a more approximate manner. Another characteristic is that age seems to be rather understated than overstated, with the result that the proportion above 60 years is usually underestimated by the census. Though in absolute terms the error is minor, it assumes a bigger proportion in relative terms, for the aged population is rather small in a high fertility regime. Age understatement is obviously more pronounced among women--and not only among film actresses. Added to this is a certain resentment to reveal one's real age as it is usual with women.

II.5 Migration

Before investigating the concepts used in the censuses to evaluate migration, we will examine the availability of data and their limitations, particularly the problems arising from changing administrative boundaries. Supposing that a migrant is defined by his/her place of birth (PB) and his/her place of enumeration. If both are distinct, the birth place can be classified under the following categories.

1 Elsewhere in the district of enumeration (intra-district)
2 Other district of the state/province (inter-district, intra-regional).
3 Other state/province (interstate, inter-regional)
4 Abroad (international)
5 Urban or rural (inter-zonal)

A detailed cross classification of inter-district migration provides a matrix of intra-regional population redistribution which is crucial to understand inter-district growth variations. Necessary tabulations are however available only for 1891, 1901, 1911, 1921, 1961. In the other censuses, the tabulation is simplified by clubbing together all or some districts of birth ("born in other districts of the state", "born in adjacent districts"); in 1871 and 1941, it is simply missing.

But the main limitations of the data rest with their geographical definition. Continuous changes in the administrative boundaries seriously hamper demographic analyses. Table II.11 gives several examples of migrations which are classified in different ways according to the reference period. We have restricted ourselves to the effects of the formation of Tamil Nadu state on migrations between adjacent territories; the changes in the districts' map offer a somewhat similar picture.

Table II.11 <u>Migration types according to the administrative divisions</u>

Description of migration	Administrative unit of reference	
	Madras Presidency	Tamil Nadu
1 From coastal Andhra to Telengana	Inter-regional	does not apply
2 From Coromandel coast to Rayalaseema	intra-regional	inter-regional
3 From Pondicherry to South Arcot	international	inter-regional
4 From Kaniyakumari to Tirunelveli	inter-regional	intra-regional

The first case is probably the most disturbing one as district of origin is not furnished for inter-regional migrants. Therefore migrants from the Madras Presidency as given by the colonial censuses may be from Tamil Nadu or from other regions (coastal Andhra, Malabar..). The use of the Presidency's boundaries in colonial statistics makes it difficult for us to estimate the specific contribution of Tamil Nadu to the migration streams. Its level may vary from high (migration to Ceylon), through moderate (migration to Burma) to negligible (migration to Hyderabad). The other examples given indicate similarly that inter-regional migrations are extremely difficult to estimate from census data before 1961[31]. At the same time, estimates of the vital rates in Tamil Nadu prior to 1971 are far from robust so that net migration cannot be estimated as the difference between the overall growth and the natural increase.

Even though inter-regional migrations cannot be computed from census data prior to 1961 the census figures offer enough material to analyse inter-district migrations for certain census years. We will now examine the concepts from which migration is measured and try to assess the reliability of the migration data which stem from them. From 1881 onwards (with the exception of 1941 census), the census schedule included a question on the place of birth. Therefore, a census migrant is simply a person enumerated at a place different from his/her birthplace. Later in 1961, the Registrar General introduced a question on the length of residence at the place of enumeration (1961) and in 1971 a question on the place of last residence (PLR). The concept of last residence refers to the last "usual residence" excluding temporary moves and shifts within the same settlement unit (town for instance)[32]. This new question was designed to give a better picture of step

migrations as well as return migrations (i.e. migrations back to the birth place): both these categories of migrations were previously missed by the place of birth statistics. One would expect to have more PLR migrants than PB migrants as the latter should be necessarily included among the former[33]. But this is not always the case and usually PB and PLR statistics are surprisingly close to each other. In 1981, a further question on the reasons for migration was included in the census schedule. Its scope is more sociological than demographic and hence will not be discussed here.

However elementary the question on the place of birth may sound, it is not devoid of ambiguity. The custom to give birth to one's (first) child at the residence of one's parents generates a large number of apparent migrants if the mother hails from a different place; whether the actual birthplace does not in fact get confused with the current place of residence of the parents is moreover an open question. But our contention is that such a distortion is of minor importance,[34] when compared with the more basic problem of whether birthplace (when different from the place of enumeration) is asked at all. Let us keep in mind that the enumeration has to enquire about the birthplace of all the members of the family who may not be present during his visit. As mentioned previously, the head of the family may not be aware of the birth place of his daughter-in-law. With a predominantly patrilocal residence system combined with one of matrilocal confinements, the picture is far for simple even in the absence of any non-marriage migration. In such a context, the enumerator may well skip the question altogether and return the place of enumeration as the birthplace for the whole household. This somewhat extreme

hypothesis is unfortunately confirmed by one of the examples examined below. As to the PLR statistics, the question of the last residence is probably less subject to misstatement or recall lapse, but here the concept of last residence itself which cannot be strictly defined may be the cause of certain confusion.[35]

All this constitutes a collection of presumptive reservations vis-a-vis migration statistics which are not easy to substantiate statistically as we will see further below. As to the census reports, they offer scanty information on the reliability of the migration statistics. According to the 1911 census superintendent, migration would on the contrary tend to be overestimated, but his contention is debatable.[36]

Testing the reliability of the migration figure is an uneasy exercise as we do not possess comparable data which could permit us to check the census figures. However, I have examined few specific cases for which alternative data were available. I will simply summarise some of these results but give more details on inter-district migration.

My first two examples are derived from the 1981 census and concern themselves with international migrations. Thus, the Tamil repatriates from Sri Lanka (not to be confused with the refugees) started flowing to south India (Tamil Nadu) in the mid-sixties when the Sirimavo-Shastri pact was implemented. As the process of repatriation was watched with concern by both Indian and Srilankan governments, the yearly inflow of repatriates was duly monitored and the figures I owe to the courtesy of the statistical section of the Department of Rehabilitation, Government of Tamil Nadu, are therefore highly reliable; they indicate that

about 2.9 lakhs repatriates came to India between 1971 and 1981. As against this figure, the Census of India indicates that the number of people of Srilankan origin (by birth or last residence) coming to Tamil Nadu between 1971 and 1981 was in the order of 1.6 lakhs which simply means that about 50% of the repatriates are missing from the migration statistics.[37] This finding is certainly disquieting to say the least.

Another example is based on returnees from the Gulf countries, among which Saudi Arabia, Kuwait and the United Arab Emirates had an Indian population estimated at 1.7-2.2 lakhs during the second half of the 1970's. In 1981, less than 0.1 lakh people were recorded as migrants from these three countries[38], which gives a ratio of 3 to 5% to the total Indian population residing there. In view of the pattern of migration to Gulf countries, this is again a blatant underestimate.

What follows is a more detailed analysis based on interdistrict migration data. The idea is to examine the change in the proportion of migrants during a decade in two districts which have recorded a spectacular growth as a result of migration pressure. The districts used will be Nilgiris in 1921-31 and Madras in 1961-71. They have been selected along three criteria: rapid growth necessarily due to immigration, data availability, intercensal boundary stability.

The idea consists in simulating a "normal growth" of the resident population, similar to that of the whole state, and use it to project the population onto the next census. However, it must be borne in mind that children born to immigrants are not immigrants themselves as they were born

at the place of enumeration. The model is formulated as follows:

$$(1)\ P_2 = P_1 \times ni + EM + M \times mc$$

where Pi = Total district population at the i-th census data)

ni = Intercensal natural increase (my estimate)

NM = Net native migrants (migrants born in the district)

EM = Net external migrants (migrants born outside the district)

M = NM + EM = Net inter-censal migrants

mc = Proportion of children among the intercensal migrants

During an intercensal period, the components of population increase at the district level are the following: a) natural increase of the district population (ni); b) net migrations (NM+EM); and c) natural increase of the intercensal migrant population (M x mc). Supposing that migrations were constant over the intercensal period, the proportion of children born to migrants in the district of their new residence can be estimated as 1/4 of the population aged 5-9 and 3/4 of the population below 5; this figure is computed from the proportion of these specific age-groups to the rest of the population as obtained for the whole of Tamil Nadu during the second census. This ratio is very close to 15%. With our estimates for ni and mc and the census data for P1 and P2, we can deduce a reasonably good estimate of the net migrants as follows:

$$(2)\ M = (P_2 - P_1 \times ni) / (1 + mc)$$

Now the population will be further decomposed into the native population NP and the population born outside the district EP (P = NP+EP). The population EP can increase only by migration (EM) for the migrants' offspring is born in the district itself; it will decrease under the effect of mortality which will be simulated by the usual survival ratio sr (population above 10 during the 2nd census / total population during the 1st census) computed from Tamil Nadu's age-structure. We have therefore

$$(3)\ EP_2 = EP_1 \times sr + EM$$

Using census figures of EP1 and EP2, we can derive an estimate of EM and then NM (NM = M-EM). But NM (net migrants, native of the district) is likely to be a (small) negative value since the number of natives returning to their district of birth cannot reasonably be higher than that of natives leaving it. In case it is not, i.e. in case we have M > EM, it indicates that either M has been overestimated or EM underestimated; the first case is less probable as M is based on relatively good data (equation (2)). The more likely second hypothesis would mean that equation (3) had understated EM because the migrant population EP has been equally underestimated by the census. Table II.12 displays the data and the estimates used in the two examples we have selected. The first six rows include census data on population and on overall growth, whereas the next three rows present the estimates used in our computations.

Table II. 12 Testing Migration Data at the District Level

	Nilgiris 1921-31	Madras 1961-71
First census		
Total population (P_1)	126519	1729141
of which in-migrants (EP_1)	40349	642828
Second census		
Total population (P_2)	169330	2469449
of which in-migrants (EP_2)	72188	779820
Intercensal growth		
District	+33.8%	+45.2%
State	+8.5%	+22.3%
Estimates		
Natural increase ni	+9.1%	+23.38%
Children mc	0.1514	0.1508
Survival sr	0.828	0.912
Results		
Total Migrants M	27182	292001
of which natives NM	-1159[illegible]	+98440
non-natives EM	+38779	+193560

Sources : see text.

In the case of Nilgiris, results appear to be plausible, the increase in population (+43000) has been mainly due to the net migration inflow of 27000 persons. Interestingly enough, in-migration was still higher (+39000) but a large number of natives seem to have left the district (12000); this last figure exaggerates probably the out-migration of natives but unfortunately we do not have the 1931 figures of Nilgiri-born migrants enumerated outside the district.

On the contrary, estimates arrived at from the Madras figures do not make any sense since they mean net in-migration of nearly one lakh of Madras-born population. Even if this population was wrongly classified by place of last residence (for natives cannot in-migrate to their native place as per PB statistics), it is obviously an astronomic figure. This non-sense stems directly from the underestimation of the number of migrants, especially in 1971, when after a decade of spectacular urban growth, their proportion in the total population fell below a third.

The previous two examples do not lead to a single conclusion. On the contrary, they indicate tremendous variations in the quality of migration figures between districts. In the case of Madras, the responsibility probably rests with the vague and changing geographical definition of Madras district (as distinguished from Madras Municipality, Madras urban area, Madras region...) which very few people may be able to identify properly. Moreover, the quality of the census in Tamil Nadu's metropolis is known to be less satisfactory than in the districts. The remark concerning Madras boundaries can be extended to several administrative units lacking a stable historical definition as in the case for Tamil Nadu itself, the

newly formed districts (in 1911 or 1981) and the urban areas (previously rural areas). On the other hand, Nilgiri district has not undergone any change since 1881 and its boundaries coincide with natural boundaries. Birth place identification is therefore easier.

This somewhat lengthy section on migration data has highlighted many of their deficiencies and it must be recognized that their accuracy is somewhat unpredictable as we have just seen. Not only are they unreliable but they also suffer from serious defects due to the changing administrative boundaries and are therefore of practically no use for quantifying interstate migrations[39]. At best, they can be utilized as secondary data indicating direction and relative volumes of migration streams.

II. 6 Other census data

Marital status

1881 census is the first one to have incorporated a question on marital status (civil condition). Data were systematically classified by sex and district, but age cross-classification was very variable between 1901 and 1951 as Table II.3 has shown us. Computation of the mean age at marriage which can be performed from data of a single census by Hajnal's method[40] requires five-year tabulations from age 10 to age 40; proportion of single persons in broad age-groups like 15-24 (1951 census) or 20-39 (1901, 1911 census) are far too vague to be meaningful. Data reconstruction for missing categories can be done by using the five year break-down of the Madras Presidency, but this is

slightly dangerous as the matrimonial regime in Tamil Nadu was significantly different from that of the rest of the Presidency. For example, women married later on the average in Tamil Nadu than in the Telugu districts and therefore the regional break-up of the 20-39 age group (for the censuses of 1901 and 1911) may not reflect accurately the specific marriage schedule of the Tamil areas. A more reliable way consists in using the detailed 1891, 1941 and 1961 quinquennial data to establish the regression equations with age at marriage as the dependent variable and married proportion at various age (like 15-24, 20-39..) as the independent variables. Correlation with two or three independent variables is extremely high (r > .99) and resulting estimates display a narrow confidence range.

Marital status data are always available for specific groups like religion (1881-1931) and selected jatis (1891-1931); after independence, urban-rural differences have been also systematically tabulated.

Marriage in India is the main rite of passage in one's life and the incidence of spinsterhood is almost negligible among the elderly, unlike in western Europe. In the past, marriage or betrothal often preceded the attainment of physiological maturity among girls, including in south India where the high-caste model of pre-puberty marriages was emulated by many other communities. Child marriage was a very shocking institution to the Britishers (who would marry far later, if ever); they held it responsible for a extensive range of social evils. But as marriage was often celebrated at an early age, effective cohabitation between the spouses was delayed till the menarche of the bride. As a result, a large number of

young girls were widowed before the actual commencement of their marital life, a fact which got reflected in the census figures and fuelled the debate on (virgin) young widows among Brahmin circles in South India (strict orthodoxy forbids any remarriage for women once saptapadi ceremony has been already performed). But to the demographer, marital status hardly matters: what is relevant is marital life, i.e exposure to the risk of conception or not. However, as a census superintendent put it:

"for sociological purposes it would no doubt have been more interesting to have collected statistics showing only consummated marriages, but it would not be possible to obtain these without undesirably detailed enquiries into people's private affairs" (Census of India 1901, XV, I:56).

Therefore, marital status from 1881 onwards has always been entered as stated by the respondents. As mentioned before, this means that many young men and women returned as married were probably still staying at their parents' house; mean age at marriage if computed with married proportion below 10 is therefore an underestimate of the mean age at the beginning of marital life (starting after consummation).

The link between estimated age for girls and marital status has already been referred to in the section on age. As girls were expected to be married at the age of menarche, there was probably a tendency to attribute younger ages to unmarried girls and age 15 seems to have been the turning-point; thus we can notice that the proportion of women in the age-group 15-19 was only 75% of that in the previous age-group 10-14 (see the average 1881-1961 age structure).

Another cause of distortion was the problem of widow remarriages and of divorces which were looked down upon in the high-caste traditional system even though they seem to have been rather numerous among Muslims and low castes.[41] Divorcees were not even separately recorded before the 1951 census and were included among the widows. Thus, there was probably a significant overestimation of the proportion of women currently married as the 1921 census report suggest (1921, XVIII, I:101). This phenomenon combined with male emigration and polygamy results in a larger figure being returned for married women than for married men.

Urban areas

Indian urbanization has already been covered by numerous studies which stress the consequences of the changes in the definition of urban areas. We will limit ourselves to a few remarks on the definitions used in the census of the Madras region and the effects on the measurement of urban dynamics.

In 1871, no concept for urban areas existed. On the one hand, the census gave sex-and religion-wise figures for the municipalities, i.e. the localities under the Municipal Act (see Census of the Madras Presidency 1871, I: 372)[42] Elsewhere in the census, all "towns and villages with a population above 5000" were simply listed without any other detail than the total population. Only in 1881 did there appear a definition of towns which can be municipalities or any other localities deemed urban by the census director with respect especially to permanent markets of manufactured

goods (Census of the Madras Presidency 1881, I:192). The number of towns in the Presidency is then 227, as against 45 municipalities or 479 localities of more than 5000 inhabitants in 1871. The census of 1891 imposed a minimum of 5000 inhabitants to non-municipal towns of "district urban character" (Census of India 1891, XIII: 22-23) and the number of Census towns slightly decreased.

Although this definition underwent minor changes thereafter[43], its main features remained constant till 1951. Urban areas consisted of municipalities, civil lines and cantonments plus a number of localities with specific urban character (population above 5000, continuous collection of houses..) which the Madras census superintendent decided to treat as towns. This last category was rather unstable as it was left to the census director's discretion and did include towns with less than 5000 inhabitants.

In 1961, criteria for urban areas became stricter for apart municipalities and other boards (cantonments, town committees...), places considered urban were to meet the following requirements: a) density above 1000 persons per sq.mile b) population above 5000
c) three-fourths of the male working population not engaged in the primary sector

But the definition still included a provision for localities which possessed "pronounced urban characteristics" according to the provincial census authorities. This definition was retained in 1971 and 1981 censuses without notable change.[44]

As there is no objective definition of a town, the fluctuating concept of urban area is difficult to analyze. It may be worth (except in Kaniyakumari and the Nilgiris) tends to favour proto-urbanization with compact localities well separated from each other, especially in the dry tracts. Whether these big villages qualify for urban status is an uneasy question better answered on an individual basis. The demographic requirement of 5000 inhabitants does not necessarily coincide with the primary definition of town in economic terms (as distinct non-agricultural localities). In other geographical regions as Kerala to which Kaniyakumari belongs, the scattered settlement pattern and specific village divisions renders a narrow demographic definition simply useless (see Mencher, 1966).

The main computational problem with urban areas rests with the examination of the rate of urbanization. Usually computed as the ratio of urban populations of successive censuses, this rate is somewhat incorrect in that it pertains to changing reference areas. Towns declassified or newly introduced during the second census tend to distort the result since the urban populations used do not refer exactly to the same areas. Overall urban growth has therefore to be decomposed into its demographic (natural increase, migration) and classificatory constituents[45]. The demographic component is more exactly calculated by the growth of areas which were urban during both censuses. But a further problem stems from the changing boundaries of towns themselves through incorporation of surrounding areas, formerly urban or rural district units. In such a case, growth is artificially inflated by the mere addition of peripheral localities and it is often impossible to take this defect into account for want of sufficiently detailed data.

In a conclusion, we may examine two new census categories which appeared in 1971 to replace the former concept of town group: urban agglomerations and standard urban areas.[46] Urban agglomerations cover a continuous urban zone made up of several contiguous towns as well as surrounding urbanized villages ("peri-urban" areas). They can be of limited population (the smallest possessing 16000 inhabitants in 1981) but are composed of strictly urban units, including very small urban localities of less than 5000 inhabitants. Some large towns are excluded from this category if they are in one piece, without contiguous satellite localities; this is notably the case of Thanjavur, Nagercoil, Dindigul and Cuddalore.

The definition of standard urban areas is of a different nature and has been devised rather to fit the needs of regional urban planning and development programmes. These areas contain a central core town of at least 50000 inhabitants and its periphery regardless of its urban/rural status. This periphery is supposed to meet certain criteria among which we may note:

- Intensive socio-economic interaction with the core town (especially with respect to education, employment, transportation...)
- Predominant urban land use
- Anticipated further urbanization in the future.

Standard urban areas are thus conceived as dynamic growth centres the monitoring of which depends on the Tamil Nadu Town and Country Planning Department. Contrary to the concept of urban agglomerations which stems from mainly demographic, geographic and administrative definitions, a standard urban area is defined in a developmental perspective and encompasses large rural tracts considered to be in the process of urbanization. It may be observed that rural areas account for 54.3% of the total area of the standard urban areas, but only 13% of their total population (1981 figures).

Linguistic data

Even though data on mother tongue would seem to be of marginal interest in a demographic study, they prove to be of crucial importance in estimating migration, for they offer a very reliable picture of the geographical dispersion for the Tamil - speaking population identified with Tamil Nadu's. Linguistic data were first published in 1881 and are available at a district level for each census with the exception of that of 1941 which contains not a single tabulation of linguistic data. More recently (1961,1971) these were even tabulated at a taluk level, but have however not yet been published for the last 1981 census.

Variations in the definitions used (mother tongue, language of childhood or language spoken at home) are probably of negligible consequence on the comparability of data from successieve censuses. Moreover, owing to the strong identification of every individual with his/her sub-caste or religious community which is itself embedded within a linguistic group, chances of misstatement are few. In 1921, the report observed:

"the instructions were simple and easy to grasp and it is probable that the statistics of language are about the most accurate of any collected at the census" (Census of India 1921, XIII, I: 134)

At the all - India level, the returns for the Tamil - speaking population were likely to be of similar quality in view of the strong identification of the Tamilians with their mother tongue. Moreover, linguistic migrations (changing one's usual language) were probably limited to rare cases of interlinguistic marriages[47]. Finally, it is worth noting that contrary to several north Indian language whose fluid frontiers are unstable, (48) Tamil like the other main Dravidian languages (with the exception of Tulu sometimes mistaken for Kannada) represents a well-defined language hardly subject to wrong identification.

Religion and Caste

Whereas religion was eliminated from the schedule of the census in Britain after the 1851 census, the British found no apparent difficulty in using this category in the Indian census. As early as 1871, religion was included in the census schedule and has remained a permanent feature of the census of India till today.[49] The question on religion was even broadened in several colonial censuses to include various sub-sects. Simultaneously, the British started to record the caste of the population, a question which soon became highly controversial for various reasons. In doing so, they assumed that the population was strictly divided into closed, well-defined groups which they attempted both to identify and quantify.

A few words may be said in this respect. A census is an attempt to quantify different sub-sets within a total population. To define those sub-sets, their boundaries and ultimately their demographic size, the census makes use of different category which act as simple binary tests: what is your sex, your age group etc? If these sub-sets failed to be properly isolated as was the case with age, it was mainly because the concepts used could not be translated in the Indian context and hence were replaced by alternative approximate categories which in turn determined pseudo-groups. But one can reasonably argue that every body has an age in spite of the difficulty to estimate it accurately.

Now, there is another type of categories which do not comply with this binary logic. One of them is for example the question related to occupation (" are you a worker?", "are you an agriculturist?") and it resulted in an uninterrupted series of different definitions which it would take several pages to chronicle. But the caste classification was still more problematic for it was based not on abstract conventions, but on apparently indigenous categories by which society could be neatly divided into independent segments (with every individual belonging to a single, specific community). This assumption was obviously borrowed from the higher castes

characterized by a strong degree of self-identification. But when the model was applied to the majority of the Presidency's population, it soon appeared that sub-caste definitions and boundaries were rather fluid and the resulting partition was made of what would be better termed as "fuzzy subsets".[50] As a result, there was probably no reliable way to partition society into independent, self-contained sub-groups in a fashion that could be both exhaustive and non-redundant. For one thing, the subcastes' appellations kept changing and the census nomenclatures were hence markedly unstable. The very castes the census was supposed to capture statistically were precisely in their own constitutive process and the caste returns contributed as much to their creation as to their identification. Then the census became an instrument for the development of caste consciousness, with certain communities trying to assert their otherwise vague identity in a process which is now part of Tamil Nadu's socio-political history. The further attempt by the census reports to order these communities by a linear ranking within the framework of Hindu ritual hierarchy was also inspired by the high castes' ideology and their perception of society, and it assumed that the numerous local or sub-regional caste rankings could be fused in a single general graduation. This similarly boomeranged: the census classification was then perceived as a tool to substantiate various claims regarding the relative status position of the different groups. At the same time, the British strategy of distributing its patronage to the "natives", especially through its education and employment policies, reinforced the search for self-identity among the various claimant-groups. This contradicted the cautious reluctance of the rulers to interfere with a social order from which they benefited even without a proper understanding of its intricacies.

But the whole process of "objectification" which Cohn has brilliantly described (1987: 224-254) triggered a long series of claims and counter-claims which contributed to obscure significantly the meaning of the caste tabulations. In 1931, the census superintendent was rather pessimistic about the fruitful use of the caste returns and in the first census after independence, it was cautiously decided to refrain from publishing the details of the caste data. Meanwhile, a legal, state-defined category of "scheduled" groups (tribes and castes) was evolved and is now a central feature of many tabulations. As long as it refers to specific sub-castes, unlikely to change their affiliation (here arises the problem of conversion and assimilation) and characterized by a strong degree of separateness from the rest of society, this category can be fruitfully used to identify the demographic characteristics of an apparently closed sub-population [51].

My comments here have remained rather abstract but the reader may easily fill the blanks. The census reports on caste provide a large bulk of material on the problems of classification, grouping and ranking and various historical studies describe in great detail the changing socio-political context of caste identity and identification in contemporary Tamil Nadu. I do not feel it necessary to burden my remarks with concrete examples or references to the same. The point I want to make simply relates to the fact that the various models employed by the British to describe and analyze the caste - structure were basically inadequate as they were founded on premises (the sub-castes as mutually exclusive closed units, ranking as a general strict linear order...) which were an over-simplification of a system allowing much more flexibility (i.e. fuzziness) than is theoretically assumed. The census were therefore again a mixed product of a native sociological perception and of the socio-political dynamics it fostered. The analyses based on caste data cannot ignore these limitations.

(1). See references to table II.1, and the Census of India (1971, 19, I-A: 1971, 19, VIII-A&B: 35).

(2). Similar optimistic opinions are found in most censuses of the Madras Presidency. Census of India (1871, I: 361; 1881, I:4) Census of India (1901, XV, IV: 27-29;1921,XIII, IV: 4, 1931, XIV, IV: 8).

(3) It may be too early to discuss the quality of this census, but certain computations not shown here suggest a relatively high level of underenumeration.

(4) These points are discussed in the census reports see e.g. Census of Madras (1871, I: 40, 361; 1881, I: 4). The floating population was also supposed to have been significantly underestimated during 1871.

(5) For a defence of the Census by its commissioner, see Census of India (1961, IX-I-A (i): 19, 134-40; IX, VIII-A: 29,35,49-54). However, a demographer who contributed several volumes to the 1961 census of Madras has expressed doubts on the reliability of the results and the commissioner's eagerness to question it (K.E.Vaidyanathan, personal communication).

(6) The best fitting consists in assuming a quadratic intercensal growth rate (r) r=a.t2 + b.t. + c (t = time). According to this model adjusted to the 1921-81 period, the 1961 population of Tamil Nadu would have been of 34.8m inhabitants (and will be of 56.58m in 1991...).

(7) Age is often stated as "completing x years" for some one who is (x-1) year old. See for example the Census of Madras (1871,I:160) and the census of India (1891,XIII:86). The problem will be examined again further below.

(8) If age was properly stated, each digit's share should be of the order of 10%. The index is computed from the population aged 20 to 58 (except for 1971 (10-19)). The Index is rather sophisticated in that it takes into account the structural effect of the declining size of the older population. Myer's global index is the sum of the absolute differences between digital indices and 10%.

(9) The 1881 figure refers to the population above 25 years in the Madras Presidency. For 1981, I have used the population above 20 in Tamil Nadu.

(10) A formal proof is obtained by calculating the correlation coefficient between illiteracy and Myer's index for the 17 larger states in 1971 (r= 0.721).

(11). These weights equal to one except for some districts which included territories outside present -day Tamil Nadu (mostly North Arcot and Coimbatore). For changes concerning bordering district. see the next chapter.

(12). There remains however a minor imperfection for the first age-group consists in the original 1-4 age-group i.e. (1,4C 71.

(13). District figures are computed in the next chapter.

(14). The quality of age data is better in Tamil Nadu than in the rest of the Presidency, as indicated by the scores computed by Mukherjee (1976:60). Therefore, reconstruction using data from the whole Presidency tends to overestimate the scores for Tamil Nadu (see the difference between 1891 and 1901-21).

(15). The age ratio score by sex compares each age group to the two adjacent groups and provides the mean deviation. Similarly the sex ratio score is the average deviation between a specific sex-ratio and that of the two adjacent age groups. The joint score is below ten for most developed countries.

(16). These are necessarily cursory statements. More precisely, stable population theory demonstrates that a population with constant fertility and mortality levels tends rapidly toward a fixed "stable" age-structure, with fixed vital rates. Quasi-stable population analysis further shows that mortality decline affects but little the age-composition of a formerly stable population.

(17) As the result, the 15-19 population is not more than 45% of the 0-4 population, a bizarre characteristic so far remained unnoticed.

(18) i.e. the age-structure of a population under unchanging fertility and mortality conditions.

(19) The gross reproduction rate is the total number of girls born by woman aged 45-49, i.e. the total fertility rate multiplied by the proportion of girls among the births.

(20). Natural increase is the growth rate corrected for migrations. The later have been deri ved from interregional and international migration estimates (not discussed in this paper). The average rate of natural increase per annum was of about 10.5 per 1000 over the period 1871-1981. The 1871-1981 decade is included because of its lasting impact on the age distribution.

(21). Remember that the stable age structure remains little affected by the overall mortality level reflected by the life expectancy.

(22). Female population, west regional pattern.

(23). See for example the estimates given by Leela and Pravin Visaria (1983:509).

(24). However, it is not improbable that Coale and Demeny's model underestimates the relative share of infant and child mortality.

(25). Although the intensity of female migration is high at these ages, their nature (mainly marriage migrations) suggests moderate net migration rates unless Tamilians "give away" more daughters than they "take".

(26). This is an important result as several techniques for estimating vital rates from imperfect age-structures use the population below 15.

(27). The under-representation of age 1 is manifest in 1881, 1891, 1911, 1921, 1951, 1961, 1971 and 1981, but absent in 1941. Single year data are for the other censuses are either missing (1871) on smoothed(1901,1931).

(28). A mixed system consists in retaining the exact age for the first half of the year and shifting to the running age afterwards (age at the closest bithday).

(29). It may be added at this juncture that the first birthday is often celebrated, unlike the succeeding ones, probably because of the high level of infant mortality. For the same reason, the naming of the child is often postponed.

(30). The question of new underenumeration young children remains open for want of concrete evidence. The same conclusion applies to the question of mortality pattern already mentioned.

(31). Zacharia's study of inter-regional migrations (1964) cannot be used as it precisely refers to the old administrative units.

(32). See for example the Census of India (1971,19,I-A:222).

(33). Unless birth place is not returned as place of last residence, which could, be the fate of children born at their maternal grand parents' residence. See Visaria and Kothari (1985:42).

(34). Visaria and Kothari (ibid:26-34) advice us against any excessive emphasis to this phenomenon. In case of Tamil Nadu where the kinship system results in short-distance marriage migrations (see Libee, 1980), the magnitude of these birth migrations is likely to be minimal.

(35). A good discussion of the availability and quality of migration statistics may be found in Chaterjee and Bose (1977:327-338). See also Chakravarty (1977).

(36). J. Charles Molony notes the inclination to attribute to the children the same birthplace as their father's, as if birthplace was transmitted through generations like citizenship (Census of India, 1911, XII, I:38). His statement is probably quite correct, but his conclusion that migrations would therefore tend to be overstated is wrong, for non-migrant heads of household are also likely to attribute their place of birth to other members of the household.

(37). This estimate can be obtained similarly from PB or PLR data. Sources of the data: Census of India (1981, I; paper 2 of 1983; II-special).

(38). Less than 5 years at the place of last residence; Census of India (1981, I, II-special). Estimates of the Indian migrant population are from Birks and Sinclair (1980) and Weiner (1982).

(39). Another problem not examined here is that PB and PLR figures for 1961-71 yield very different estimates of interstate migrations.

(40). Hajnal's method consists in identifying a census population with a cohort. Therefore if 50% of men are single at age x and 45% only at age (x+1), 5% are considered to have married at the exact age (x+1). Agarwala (1962) has evolved a somewhat similar method based on intercencal comparisons.

(41). See for example the details given by the Census of India (1891, XIII, I:151).

(42). This is the definition used in the work of Mitra et.al. (1980).

(43). A convenient summary of census definitions of towns from 1901 to 1981 may be found in the Census of India (1981, 20, II-A:17).

(44). See Premi et al. (1977: 351-71) and the Census of India (1981, 20, II-A; 5).

(45). For a more detailed treatment of this problem, see Nagaraj (1985 : 13-19).

(46) More details in the Census of India (1981, 20, II-A:5-6 and 229-30).

(47). The 1901 census report states that the language returns afford little information "for a man drops the language of his mother country more easily than he losses his nationality" (Census of India 1901, XV, I:97). This assertion is totally inadequate in the Indian context.

(48). Owing to the problems of religious definition (Hindi for Hindus, Urdu for Muslims, Punjabi for Sikhs) and language recognition, (Rajasthani, Bhojpuri...)

(49). Religion figured also in the pre - 1871 surveys.

(50). Fuzzy sub-sets are defined by a non-binary, continuous degree of "belongingness". It follows that two individuals from such a grouping do not unambiguously belong to the same caste (as defined as an endogamous unit). More concretely, it means that two persons claiming to belong to the same loosely defined caste may actually belong to different groups.

(51). The same may be said about the religious groups (for which however there exist less data).

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III. RECONSTRUCTION OF TAMIL NADU'S POPULATION

III.1 An overview of the problem

Although the British set foot in south India as far back as in the 16th century (in Machilipatnam, Pulicat and Madras), the actual annexation of the Tamil areas took place only later during the last decade of the 18th century. After having defeated the Maratha and Mysorean forces and gradually suppressed the local chieftains in the south of the Peninsula, what they inherited were the remnants of very different political units. The majority of Tamil-speaking India became then part of a huge Madras Presidency which also included coastal Andhra, large tracts of the Deccan and a coastal strip along the Arabian Sea. Among the Tamil regions left out from the Madras Presidency the biggest one was the southernmost Kaniyakumari area belonging to the Princely State of Travancore. Two French settlements along the Coromandel coast (Pondicherry and Karaikal) were also excluded from the Presidency. The feudatory state of Pudukkottai which enjoyed a certain amount of autonomy, owing to its full cooperation with the British army was to all intents and purposes ruled by the colonial power through the British-appointed Diwans. In 1956, the state of Tamil Nadu (originally Madras) was formed by grouping together the Tamil-speaking areas of south India excluding the former French territories which became later part of an independent Union Territory.

All statistical sources pertaining to Tamil Nadu refer to the then administrative units which have been far from static over the last hundred years. In most cases, the Census of India provides estimates of the population of the new administrative units for the previous census, allowing thereby for the computation of the intercensal growth rate. But this reconstitution seldom applies to earlier periods. As a result, the reconstruction of Tamil Nadu's total and district population before 1981 requires a thorough examination of the administrative map of pre-independence India, including the

changing boundaries of the Presidency's districts as well as the bordering regions of Travancore and Pudukkottai states.

During the first decennial census of 1871, the Presidency was divided into 21 districts, originally fiscal collectorates, to which were added several semi-autonomous territories like Pudukkottai. The Tamil-speaking areas encompassed twelve districts (including Pudukkottai) as follows:

1. Madras Town
2. Chengalpattu
3. North Arcot
4. South Arcot
5. Thanjavur
6. Tiruchirappalli
7. Madurai
8. Tirunelveli
9. Coimbatore
10. Nilgiris
11. Salem
12. Pudukkottai State

Most districts were further subdivided into divisions and taluks, the latter being themselves collections of revenue villages. There were nevertheless other subdivisions like the zamindari areas (Arcot, Ramanathapuram...), the Nads (Nilgiris) and municipal wards (Madras). From 1911 onwards, all these subdivisions were treated as taluks by the Census.

The main problem encountered in reconstructing Tamil Nadu's population is the continuous transformations which the administrative map underwent. At the broadest geographical level, the boundaries of the provinces were completely altered during the state reorganisation in the 1950's. Districts and taluks have also undergone numerous changes from 1871 to 1981, including territorial exchanges, mergers and bifurcations. We may summarise these administrative modifications by a simple typology:

1. Transformation of an existing administrative unit
2. Formation or absorption of an administrative unit

The first case is characterized by the incorporation or the cession of a part of an administrative unit. It may be simply the transfer of certain territories from an unit to another unit (a loss to the former, a gain to the latter) but it sometimes involves a combination of several simultaneous transfers which consist of complex territorial exchanges. Here are several examples:

1. Exchange of villages between Andhra Pradesh and Tamil Nadu in 1961;[1/]

2. Transfer of Namakkal taluk from Salem to Tiruchirappalli between 1911 and 1921;

3. Transfer of territories from Saidapet taluk to Madras in 1951 and 1981.

The second type of boundary change occurs when an existing administrative unit disappears by incorporation into another or when a new unit is carved out. It entails a change in the total number of units. The most common of these changes has been the dismembering of former units leading to the creation of a new administrative entity, of which the bifurcation is the simplest form. However complex combinations involving several units also took place. Various examples are given below in order of increasing complexity.

1.Bifurcation of Salem district in 1971 for formation of Dharmapuri;

2.Loss of territories of Omalur taluk on the formation of Mettur taluk in 1931;

3.Palladam taluk losing territories to Avanashi and gaining territories from Pollachi in 1911.;

4.Formation of Pudukkottai district in 1981 involving the transfer of 4 taluks from Tiruchirappalli and Thanjavur and the formation of 2 new taluks carved out from various segments of taluks in Tiruchirappalli and Thanjavur.

We shall now examine the main features of these changes starting with the transformations involving taluk boundaries.

III.2 Tamil Nadu's taluks and boundaries

Table III.1 sums up the numerous changes which have taken place since 1871 at the taluk level. We have retained here the district divisions as obtained during each census in order to give also a general idea of the changes which occurred at the district level.

Table III.1 Number of Taluks and Districts in Tamil Nadu. 1871-1981

	1871	81	91	1901	11	21	31	41	51	61	71	81
Madras	1	1	1	1	1	1	1	1	1	1	1	1
Chengalpattu	6	6	6	6	6	7	7	7	7	8	8	12
N.Arcot	14	14	16	11	11	11	11	11	11	11	13	13
S.Arcot	8	8	8	8	8	8	8	8	8	8	8	12
Salem	9	9	9	9	9	10	11	12	12	12	8	9
Dharmapuri	-	-	-	-	-	-	-	-	-	-	6	8
Coimbatore	10	10	10	10	10	10	10	10	10	9	9	6
Periyar	-	-	-	-	-	-	-	-	-	-	-	6
Nilgiris	1	1	3	3	3	3	3	3	3	3	3	4
Tiruchi-rappalli	5	5	5	5	7	7	7	7	10	10	10	10
Pudukkottai	1	3	3	3	3	3	3	3	-	-	-	6
Thanjavur	9	9	9	9	11	11	11	11	11	12	12	16
Madurai	8	7	15	15	8	8	8	8	8	8	12	13
Ramanatha-puram	-	-	-	-	9	9	9	9	9	9	9	18
Tirunelveli	9	9	9	9	9	9	9	9	8	9	11	14
Kaniya-kumari	(5)	(5)	(5)	(5)	(5)	(4)	(4)	(4)	(4)	4	4	4
Total no. of taluks	86	87	99	98	100	101	102	103	102	104	114	152
Total no. of dist.	12	12	12	12	13	13	13	13	12	13	14	16

Notes:

Madras: divided into divisions, not taken into account
Nilgiris: divided into Nads, municipalities (...) before1891
Madurai: Ramnad and Sivaganga taluks were clubbed together in 1881
Tirunelveli: Anjengo and Tengasseri territories classified as taluk
Kaniyakumari: included in Travancore division before 1951 and in Trivandrum district in 1951
Total: Independant sub-taluks included for 1981

It can be noticed that the number of taluks has never remained constant between two successive censuses. However, the progression in number appears to have been moderate from 1891 to 1961, and far below the pace of demographic increase. Thus we observe that whereas in 1871 the average district and taluk population were respectively 1.3 million and 1.97 lakhs, these means gradually increased over the decades to reach the considerable values of 2.9 million and 3.61 lakhs in 1971. The growing demographic weight of these administrative units has prompted the regional government, during the last decade, to undertake a programme of deep administrative reorganisation during the last decade with several further subdivisions in the offing.[2/] Other socio-political considerations have also a role to play in these decisions.

Modifications of taluk boundaries have been studied over the entire census period. It is worthy of mention that most of them are not described in the census reports even though the populations of the new units are often computed for a few preceding census years. To examine these administrative changes, we have resorted to various techniques, viz. cartography and analysis of intercensal variations in area and population. These are by no means perfect methods, nor has it been easy to apply them where, such as in the older census volumes, necessary details are missing: for instance, district mapping is not available in the census reports in 1881 and 1891 and for taluks before 1901.[3/] The poor quality of the maps published often hampers intercensal comparisons. Another source of difficulty is the estimation of taluk areas (available from 1881 onwards): with improving geodesic surveys, the estimates of the areas of the Presidency's administrative units have kept changing right up to 1961,[4/] and consequently area changes for a given unit between two censuses do not stem necessarily from territorial modifications. Therefore the list of taluk administrative changes (not reproduced here) is subject to several mistakes and omissions. A detailed study of these

boundary modifications which we estimate to be of the order of 400 over 1871-1981 (remember that Table III.I pertains solely to creations and absorptions of administrative units) is not required for our present study which concerns itself only with the state and district populations.

It may sound odd to speak of "state boundaries" before 1961 when Tamil Nadu (formed in 1956) was still a part of a larger unit encompassing also numerous non-Tamil tracts. It is however crucial to identify the boundaries of Tamil Nadu which used to cut across several districts and taluks in order to reconstruct the population in the past from the available data as they are classified in the census tables. The formation of Tamil Nadu was firstly a grouping of districts, along with the incorporation or the loss of territories of lesser size. In the following Table we shall restrict ourselves to the changes affecting the bordering districts since changes in the interior districts (Thanjavur, South Arcot...) do not affect the estimate of the total population.

Table III.2 Changes affecting the bordering districts of Tamil Nadu

Intercensal period	Regions concerned within Tamilnadu	outside Tamilnadu	Territories exchanged	Population involved
1871-81 1	Nilgiris	Wynad (Malabar)	3 ashams incorporated in the Nilgiris	25,440
1881-1901	No change			
1801-11 1	North Arcot	Chittoor	7 taluks from North Arcot ceded to Chittoor	974,671

contd..

Intercensal period	Regions concerned within Tamilnadu	Regions concerned outisde Tamilnadu	Territories exchanged	Population involved
1911-21				
1	Gudiyatam (N.Arcot)	Chittoor	Parts of taluks incorporated in Gudiyatam	524
1921-31				
1	Kangundi (N.Arcot)	Chittoor	Transfer of kuppam area from N.Arcot to Chittoor	53,507 (1931)
1931-41	No change			
1941-51				
1	Tiruchira-palli	Pudukottai	Incorporation of the Pudukottai state into Tiruchirapalli	438.348 (1941)
2	Chengalpa-ttu	Nellore	Territories ceded to Nellore	?
3	Tirunelveli	Travancore (Cochin)	Territories of Anjengo Tengasseri ceded to Travancore-Cochin	7,164 (1951)
4	Coimbatore and Salem	Mysore	exchange of villages with Mysore	4,269 (1961)
1951-61				
1	Kaniya-kumari	Trivandrum	Four taluks of the district ceded to Madras State	996,615 (1961)
2	Tirunel-veli	Quilon (Kerala)	Incorporation of Shencottah (minus 4 villages) into Tirunelveli	66,473 (1961)
3	Coimbatore	Mysore	Kollegal taluk ceded to Mysore	138908 (1951)
4	Chengalpa-ttu	Chitoor	incorporation of Tirutani taluk into Chengalpattu	213814 (1961)
5	Chengal-pattu & N.Arcot	Chitoor & Nellore	Village exchanges	40435 (1951)

Since 1961, the borders of Tamil Nadu have not undergone any change. As can be seen from this table, the areas most affected by boundary changes have been the Tamil-Telugu porous demarcation line of northern Tamil Nadu. During the first census of 1871, they were chiefly part of the larger North Arcot district which contained a mixed Telugu and Tamil population. Chengalpattu possessed also a sizeable number of Telugu-speakers. With the formation of Chittoor district in 1911 and continuous boundary readjustments till 1961, the linguistic homogeneity of both North Arcot and Chengalpattu was clearly established with an increasing population of Tamil-speakers in these districts, as our next table indicates:

Table III.3 <u>Proportion of Tamil and Telugu speakers in North Arcot and Chengalpattu district, 1901 and 1961</u>

		1901	1961
Chengalpattu			
	Tamil	73.6%	87.1%
	Telugu	23.8%	12.6%
North Arcot			
	Tamil	56.3%	82.6%
	Telugu	38.8%	9.8%

<u>Sources</u>: 1901 and 1961 census figures

Two other sizeable transformations accompanied the linguistic state reorganisation of the 1950's. The large but thinly-populated taluk of Kollegal was transferred from Coimbatore to Mysore owing to its chiefly Kannada-speaking population. Four Tamil taluks from Trivandrum district were added to Tamil Nadu and formed the new Kanniyakumari district.

As for the present 16 districts, we observe from Table III.1 presented above that only eleven of them have figured without

interruption in the administrative structure of the province, the others being of more recent formation. Closer scrutiny indicates that none of the eleven original districts has remained stable since 1871 owing to various territorial exchanges with bordering districts. We have counted 47 boundary changes affecting the 16 districts over the period 1871-1981, the detail of which will not be given here.

As we noted earlier, census volumes usually provde population estimates of newly formed districts for various preceding censuses. These estimates are restricted to the population total classified sex-wise. Thus the 1981 census gives estimates of the 1981 district population for 1901-1981 (Census of India 1981, 20, II-A: 101-105). Similarly the 1911 Census which followed important changes in Tamil Nadu's administrative map provides retrospective estimates for the district populations in 1891 and 1901. But at the same time estimation for the period 1871-81 was held to be impossible (Census of India, 1911, XII, II:3).

Tamil Nadu's population has thus been already estimated at a district level for 1901-81. Prior to 1901, the only estimates available are those arrived at by Mukherjee (1976) who has computed the age-distribution for 1961 Indian states over the period 1881-1961. Mukherjee's figures are however limited to state-wise population estimates. Unfortunately our own estimates indicate that Mukherjee's computations are not flawless for 1881-1901, but since the details are not given, it is impossible for us to trace the source of his errors. Furthermore, after checking the estimates for 1901 and 1911 (both from the Census of India and Mukherjee's work), it was found that the population of Kaniyakumari district had not been correctly estimated. The procedure followed, which was probably borrowed from an old census study (Census of 1951, paper one of 1957), was unduly crude; exact figures are easily obtained by adding the populations of the five taluks composing

the future Kanniyakumari district.[5]

III.3 Reconstruction procedure

The 1981 census provides valid estimates for the 1981 district populations during the period 1901-1981, with the exception of Kaniyakumari whose case will be considered further below. Our main task consists in estimating the population of the districts (as they stand in 1981) for the previous census years. Theoretically speaking, our method is of transparent simplicity: we compute for 1901 the population of the segments (districts, taluks...) covering more or less the district in its 1981 boundaries. We then compute the same for 1891 and derive from these two populations the growth rate of this pseudo-district for 1891 from the figure for 1901 as given by the census. The same procedure is repeated for 1881 and 1871.

The details of the procedure will show it to be slightly more tedious. Its steps are described as follows:

1. For each 1981 district, we recompose its pseudo-1901 population by assembling taluks and/or taluk segments as per the 1901 census returns. The estimate thus obtained is denoted by P01(01); the index refers to the specific census from which data are derived whereas the data between brackets is the reference year.

2. The population of this pseudo-district is compared with the actual population of the 1981 district in 1901 (census estimate), hereafter denoted by P(01) without index. Close examination of district and taluk changes allows us to obtain an estimate, $P_{01}(01)$, fairly close to the 1981 figure P(01).

3. The pseudo-district's population has been arrived at by applying a weighting formula (the whole taluk A plus two thirds of taluk B minus half of taluk C etc.). If God has granted us that taluk boundaries have not moved between 1891 and 1901, we may use the same formula to compute P91(91). (If not, procced to paragraph 5). P01 and P91 (91) apply then to the same areas and therefore can be utilised to compute a growth rate.

4. This growth rate will in turn be used to estimate the population in 1891:

$$P(91) = P(01) \times P_{91}(01) \;/\; P_{91}(01)$$

Similar back projection procedures will provide estimates for 1881 and 1871.

5. When taluk boundaries have undergone changes between 1891 and 1901 (an unfortunate but not impossible hypothesis), the intercensal growth rate cannot be calculated as described above for the reference areas have changed. However, (almost) every census provides estimates for taluk populations during the preceding census, For example, 1901 gives the figures for 1891 as per 1901 boundaries (this value denoted by T01 (91) values to arrive at P01 (91). Note that P01 (91) will be different from P_{91} (91). The ratio P_{01} (91)/P_{01} (01) will be used for a back projection onto 1891 as was done in paragraph 4.

6. In case boundary changes have also taken place between 1881 and 1891, we will retain P91(91) although it is different from a better P01(91) and compute P91 (81) in the same way as was done for P01(91), i.e., by applying the weighting formula to the 1891 census estimates for 1881. After computing the intercensal growth rate, we obtain the estimate for 1881 by another back projection of P(91) etc.

This apparently elementary method rests entirely on the rule of three according to which a growth rate obtained for our pseudo-districts holds valid for the present district. Comparison between pseudo-and actual districts as mentioned in paragraph 3 shows an average gap of 1% which may not result in sizeable errors in the computation of the growth rates. We are therefore confident that our district estimates reflect closely the observed intercensal growth. The details for each district's estimation will not be given here except for a single district as a matter of illustration.

Estimation of Periyar district population: an illustration of back projection procedure.

1. Periyar was formed in 1981, comprising the five eastern taluks of Coimbatore, to which were added the newly formed taluks of Perudurai and Satyamangalam.[6] The area of these taluks was included in 1901 within the four taluks of Bhavani, Dharmapuri, Erode and Satyamangalam. After 1901, Bhavani lost 13.1% of its population when Metur taluk was formed (1931) and Satyamangalam (alias Gobichettipalayam) ceded 8.3% of its population of Kollegal taluk in 1911. These proportions are subtracted from the 1901 figures to compute P (01).

01

2. The gap between P (01) and P(01) is of 2.4%

01

3. P01 (91) computed from 1901 is obtained by backward projection (see Table III.4).

4. Thus 378262 = 429312 x 388566/441007 (Males).

5. Due to (minor) changes, in Dharapuram between 1891 and 1901, the value of P01(91) is not used for the estimation of the 1881-91 growth rate. The value of P91(91) and P91(81) yields an estimate of the intercensal growth rate.

Thus 313628 = 398474 x 318497/405125 (Females)

Table III.4 Estimating Periyar's population before 1901

Taluks & Districts	1901		1891		1881		1871	
	Males	Females	Males	Females	Males	Females	Males	Females
BVN	72351	73631	59034	60835	46230	47893	51235	51278
DRP_{01}	134257	136870	124496	128351	-	-	-	-
DRP_{91}	-	-	122730	126491	94800	100432	107881	109612
ERD	137435	138025	122274	124025	96619	99050	117281	116283
STM	105729	108372	90243	93774	73762	77551	84321	85595
PE_{01} *	441007	447914	388566	406985	-	-	-	-
PE_{91} *	-	-	386800	405125	305926	318497	353728	353672
PE **	429312	438527	378262	398474	298557	313628	345920	349833

Notes: *: Specific weights applied to Bhavani and Satyamangalam (see text above)
*: 1901 figures from 1981 Census. Previous data estimated as described above

Sources: all taluk data from the respective Censuses

A last point concerns Kaniyakumari district. We have already mentioned that the Census of India underestimated its population before 1921. A very simple correction consists in adding the populations of its five taluks (Vilavankod, Kalkulam, Thovala, Agastisvaram, Eraniel) as furnished by the census of Travancore. However, the first census of Travancore dates to 1875. To estimate the population 1871, we have computed the 1875-81 annual taluk growth rates and used them for a back projection onto 1871. Note that the first intercensal period is shorter than 10 years as the 1871 census was held in November (see Chapter I).

III.4 Tamil Nadu's population: 1871-1901

The detailed district estimates are given in Appendix 1. Except for Kaniyakumari, district populations from 1871 to 1891 have been computed by back projections. Other values come from the census of 1981 (20, II.A).

Table III.5 Total population of Tamil Nadu 1871-1911

	1871	1881	1891	1901	1911
Our estimate	15818746	15497536	17961286	19279297	20910443
Other estimates	-	15978648	18231855	19252630	20912616
Relative difference (per 1000)		-31.0	-14.8	+1.4	+0.4

Sources: Other estimates from Mukherjee (1976) for 1881-91 and the 1981 Census for 1901-11.

It may be interesting to contrast this new set of estimates with previously available figures. The only district variation to be noticed relates to Kaniyakumari in 1901 and 1911. Our new estimates for this district are greater than those from the Census of India, with a relative gap of 7.4% in 1901 and of 1.8% in 1911.7/ As Table III.5 indicates, the resulting variation for the whole Tamil Nadu population is minimal. On the other hand, the difference between estimates for 1881 and 1891 is of more sizeable proportion. Mukherjee's estimates are seen to overstate Tamil Nadu's population by several lakhs. Using his figures would cause a serious underestimation of the 1881-1901 growth rate.

1. The data given here refers to the first census year, following the administrative modifications.

2. Since 1981, three new districts have been formed (Anna, Kamarajar and Pasumpon Muthuramalingam) and the creation of several other new districts has been announced at the regional parliament (Sambuvarayar, Vallalar, Thiruvalluvar, Valliammai, Chidambaranar).

3. A relatively good map of the Presidency's taluks is however available in the Manual of the Administration of the Madras Presidency (1885).

4. The reader may find a most telling example of these distortions in the evolution of census estimates for district areas over 1871-1961 (Census of India 1961, IX IA (i):91). See also the description of variations due to estimation procedures as given by the first censuses (Census of the Madras Presidency 1881, I:14-15; Census of India 1891, XIII:120).

5. The source of the confusion seems to have been the intricate taluk reorganisation of 1911 in which the former Padmanabhapuram division was replaced by the Southern Division and Eraniel taluk was absorbed by three bordering taluks.

6. Periyar may also provide an example of the confusion resulting from changes in taluk names. Satyamangalam changed its name in 1911 into Gopichettipalayam which in turn split in 1981 into Gobichettipalayam and the new taluk of Satyamangalam. Similarly Erode was known as Perundurai in 1871 and split in 1981 to give birth to the new Perundurai taluk. Another problem lies in the various spellings adopted by the census best illustrated by Sirkhazi taluk (previously known as Sheali, Shiyali, Shiyally and Sirkali) in Thanjavur district. As a rule, geographical appellations and their spelling used in this paper follow the current census usage.

IV. OTHER SOURCES ON POPULATION

IV.4 Civil Registration

Along with the census providing a regular stock taking, civil registration and its yearly account of births and deaths offers an abundant source of information for demographic analysis; however, the very poor quality of these data compels the user to adopt extreme care in interpreting the results. With a variable degree of coverage and underregistration, year-wise and region-wise, civil registration seems to defy any attempt to incorporate its results in the analysis of demographic changes. But since it offers the only data reflecting the annual fluctuations of the vital rates, it nevertheless requires a serious examination of its deficiencies and of the possible ways to circumvent them. In this section, we will recapitulate the historical development of civil registration in the Madras Presidency and try to indicate a few directions in which its data can be fruitfully made use of.

History and functioning

Civil registration was introduced in Great Britain at the beginning of the 19th century (rendered compulsory in 1837 in England and Wales) and rapidly attained a satisfactory level of accuracy; as the tradition of the registration of vital events (baptisms, marriages, sepultures) is very old in countries of Christian culture, civil registration was in no way a new institution. Even though these vital events were equally given a major religious sanction in the Indian context, there was no institution -- comparable to the Christian Church -- which ever attempted a systematic recording of their date of occurence. Therefore, the introduction by the British of the notification of births and deaths was bound to meet with formidable resistance in the form of social inertia, reflecting, as the case might be, indifference or reluctance. No wonder that the local registrar would pay scant heed to "what he and his

friends consider the idle curiosity of an ecentric Sircar" (Census of India 1911, XII, I:20).

Death registration seems to have started in Madras town in 1855[1] and was extended to the whole Presidency in 1865. The registration of births was introduced in 1868. Like for census operations, it was again the revenue administration which was made the backbone of the system of data collection (RAMP, 1868-69: 142). However, the whole registration system was under the authority of the Sanitary Department at Madras. Besides under registration which will be discussed below, the statistical records suffer from dramatic underestimation due to the partial character of their coverage; a large number of areas did not even provide any return as was particularly the case with urban localities with inadequate administrative personnel to carry out the registration, and also zamindari tracts which were administered indirectly and therefore excluded from the more comprehensive colonial bureaucratic tentacles. In spite of these major flaws, the first vital rates were published in 1866 (death rates first), by using the population figures from the 1866-67 census.[2] The total number of deaths is available from 1866 and that of births from 1870.

It must be stressed that registration was by no means compulsory in the Presidency during this period.[3] But in rural areas, vital events did not need to be properly registered in order to be actually recorded, as the local registrar was supposed to himself enter births and deaths occurring in the area under his jurisdiction.

The sketch below indicates the flow of civil registration returns from rural areas in last century's Presidency.

Local informers
↓
Village accountant or headman
↓
Taluk Revenue Inspector
↓
District Collector's Office
↓
Sanitary Department at Madras

The data collection network was closely linked to the Revenue system from which it borrows most of its agents. It may be useful to describe it in greater detail as it obtained in the last century[4] since, like the functioning of the census

operations, it has not changed significantly since then. At the village level, the informers were mainly from communities whose traditional occupation is related to births, deaths and other important rituals. This was for example in the case of dhobis (washermen), barbers (whose spouses act often as mid-wives) and priests. Village watchmen (talayari) were also informed of the deaths. The headmen or the Karnams were expected to collect indirectly all particulars on vital events occurring in their village and to send monthly returns of births and deaths (with age and cause) to the taluk headquarter which was constituted as a registration circle. These data, after being scrutinized by the Revenue Inspector, were dispatched to the Collector's office, with special mention of deaths due to cholera. Consolidated district figures were finally sent to Madras. The role of the sanitary commissioner (first appointed in 1864) was limited to data collection on sanitary questions including civil registration and their examination. He was responsible for both civil and military departments[5/] but merely as an advisor with no executive powers.

In municipalities data came from direct registration, under the aegis of the municipal bureaucracy which sent its returns directly to the sanitary commissioner. In 1871, along with the reforms in the municipal financial organisation, municipalities had the obligation of maintaining records of births and deaths.[6/] From 1870, the police had also to send daily reports in the case of outbreaks of epidemics (RAMP, 1869-70:52). After the 1876-77 crisis, the Famine Commission stressed, in 1880, the importance of compulsory civil registration, but the new laws which followed (Births, Deaths and Marriages Registration Act of 1888) preserved the optional character of registration in India. In the Madras Presidency however, legislation proved more ambitious as the notification of births and deaths became compulsory in Madras city as well as in the municipalities (through the Acts I and II of 1884.[7/]

But municipalities were still very few in the Presidency and the major reform occurred only in 1899 with the passing of a new act (Madras Registration of Births and Deaths Act) which rendered civil registration compulsory in all notified areas. The areas covered by the act of 1899 comprised most of the Presidency with the exception of the Agency division in Andhra and a large number of scattered areas in the Tamil speaking tracts: in particular, zamindari areas in the then Madurai district and a large number of villages in other districts.[8/] The act stated that registration had to be accomplished within brief intervals (4 days for deaths, 2 weeks for births) in rural areas by a male member of the family, and it also provided for fines in case of infringement. Village headmen were made local registrars.

Although the increase in the number of registered births was temporarily attributed to the 1899 Act, the legislation seems to have had no lasting impact on the overall level of registration. In 1920, the Madras government attempted to improve the system in the mofussil towns with a new law (District Municipality Registration) which contained new provisions to check the quality of civil registration. At the same time, the government set up a new sanitary organization, the Public Health Department, and appointed district health officers.[10/] The latter were entrusted with scrutinising the district returns before sending them to Madras. The 1931 census report, which gives an account of these changes, notes however that "in practice (...) vital statistics are anything but above cavil" (Census of India 1931 , XIV :I:26-27).

During the following two decades, a few modifications occurred which concerned the direct transmission of data from the Tahsildar to the Director of Public Health (1933) and the standardization of municipal statistics (1941) but with probably little consequence for the functioning of the system.[10/]

A committee appointed in 1943 to make a broad survey of the health organisation in British India (popularly known as the Bhore Committee) criticised at length the incompleteness and incorrectness of registration and suggested various steps to strengthen the system, some of which were implemented only decades later.[11/]

After Independence, each province remained under the specific jurisdictions decided by the British. There was need to make uniform civil registration all over the country, and this finally materialised in the Registration of Births and Deaths Act ratified by the parliament in 1969 and implemented in Tamil Nadu from the next year. Most details of the act[12/] were not new to Tamil Nadu which was one of the first provinces under the British to have made registration compulsory; but the most notable effect of the Act was to achieve national standardization of the data collected by the civil registration system. The 1969 Act underwent slight modifications in Tamil Nadu, the most recent ones being described in the Tamil Nadu Births and Deaths Registration Rules 1977 (as amended up to 27th January 1979).

According to the 1969 act, the central government appoints the Registrar-General of India whereas each state appoints its regional Chief Registrar (the Director of Public Health in the case of Tamil Nadu). The Tamil Nadu government also appoints the registrars for the districts and lower sub-units (Panchayat, Municipality, Corporation..) along the common administrative grid. Whereas the taluk and town registrar are under the district collector, the commissioner of Madras corporation depends directly on the Chief Registrar.

Registration is compulsory for births and deaths (including still-births) within respectively two weeks and one week of their occurrence. For events taking place in medical institutions, the responsibility of registration lies with the

medical authorities; in case of events occurring in private places, it rests with the head of the family. Other eventualities (deaths in jail...) are also provided for. Delays, refusals and falsifications are finable.

Details required for the registration include the identity of parents or of the head and several other particulars concerning them.[13/] The cause of death is also sought, but the production of a detailed death certificate established by a physician is still optional. The register in which these events are recorded will be kept by each registrar and any person can thereafter obtain an extract relating to a birth or death.

The returns are to be sent regularly from each Panchayat Registrar to the Tahsildar who then forwards consolidated statements to the Director of Public Health and Preventive Medicine. Municipal health officers dispatch directly their returns to Madras. Data are finally collected and published by the Registrar-General every year.

Data availability

Though data derived from the civil registration are considerable, very few of them have been published in a systematic or continuous way. The series we are interested in relate mainly to the districts and what follows is simply a brief overview of their availability.

From 1870 onwards, we have the annual figures of births and deaths, usually classified by sex (or with the appropriate sex ratio). They pertain to the districts in their boundaries during the concerned period. But they have been published in the Reports on the Administration of the Madras Presidency only from 1877 at a district level. Previous data refer to the whole of the Presidency. The RAMP indicates also the reference population, i.e. the population of the areas for

which returns were received by the sanitary commissioner; this is a valuable input, as many villages (sometimes complete taluks) provided no data at all. It is however felt that the areas under registration were yet often overestimated. From 1883 onwards, returns relate only to the Indian population, this excluding "Europeans and Eurasians" (Westerners and Anglo-Indians?).

Although civil registration data were collected at the taluk level (see above), taluk figures are not available save very irregularly in other publications.[14/] This precludes any attempt at recomposing a data base for present-day district before 1900. Moreover, it has not been possible to trace the registration data of Pudukottai state.

Particulars about the cause of death were published right from 1865, but only for the whole Presidency. Though they are not of high scientific value, they can help reconstitute the broad epidemiological features of mortality in Tamil Nadu.[15/] Other data published regularly or occasionally in the Reports include monthly series of vital rates, municipal rates and several mortality rates for specific age groups or religious communities. More detailed data will be probably found in the Reports of the Sanitary Commissioner in the Archives of Tamil Nadu.

For the period 1901-60 a fairly large data base has been assembled by K.E.Vaidyanathan and published in the Census of India (1961, IX, B(i) and (ii). Great pain was taken to gather the data for each 1961 district from unpublished materials lying at the Directorate of Public Health. The census figures include yearly returns of births, deaths, infant deaths and causes of death for each district. Sex and rural-urban classifications are available from 1921 onwards.

For the recent period, the most significant data from the civil registration system have been published by the Registrar-General in the annual "Vital statistics of India" (formerly "Health Statistics of India"). They include the vital rates and infant mortality rates for the districts (with rura urban classification) and more recently, maternal mortality rates. The same is available for towns of more than 30000 inhabitants.

A few remarks on the quality of the data

We shall confine ourself to offering brief comments on the civil registration data. A full examination of their reliability is beyond the scope of the present, in as much as they are no straightforward methods to cope with the numerous deficiencies of the civil registration data.[16]

As we have already mentioned, the crude numbers of vital events as given by the civil registration severely underestimate the actual extent of mortality and fertility for two different reasons. First, coverage was incomplete, either because some areas had no registration system at all or because returns were not made available to Madras. Second, in the areas for which returns were available, the extent of underregistration was more than significant: a large number of people might have not taken the trouble of getting the births and deaths registered (towns) or the registrars might have failed to report a large number of events occurring in their villages. Needless to stress again that civil registration was an institution requiring both a strong bureaucratic structure and the people's readiness to register births and deaths occurring in their family, features lacking in India. Even today, the production of a birth certificate is rarely required outside the educational system and in case of need, it seems it can be obtained any time at the tahsildar's office at a moderate rate.

Therefore, while computing vital rates (events/population), a double mistake is made: underestimation of the number of events and over-estimation of the population concerned. Moreover, these two factors are probably not comparable across time (improvement of coverage and registration) and space (district-wise specific rate of coverage and registration). For instance, a large part of the secular trends pointing to an increase of births or deaths can be confidently assigned to improved coverage and greater awareness of civil registration. District differences are also often due to variations in the coverage and registration rates of district areas. However, the civil registration data can be fruitfully used in relative terms. For example, annual variations provide a good picture of fluctuations of vital rates during a short period. They clearly depict the mortality crises which occurred in Tamil Nadu since 1870 (1876-77, 1918-19, 1943-44) and the fertility declines which often accompanied them.[17/] They make it possible to identify the regions most affected, even when they do not reflect the absolute intensity of the crisis.

We have noticed that the vital rates Events/Population are distorted by both numerators and denominators. It may be relevant to note that the index Births/Deaths (or birth rate/death rate) seems to all intents and purposes to remain unaffected by changes in the reference population. However, clumsy an index it may appear to the demographer, it allows better comparison between districts. We know also that births and deaths suffer from different rates of underregistration (deaths being probably more accurately recorded), but the unregistered events tend somewhat to compensate for each other when natural increase is considered (births - deaths).

Finally, we have so far referred only to vital rates, but infant mortality rates are also available over a long period (at a district level, since 1921). They are computed

as the ratios of infant deaths over births for each year. Again the area covered does not come into the picture as a "statistical noise" since births and infant deaths occurred in the same area. Moreover, infant mortality may be a more reliable demographic indicator than the other rates computed from the vital registration because the levels of underregistration for both births and infant deaths may cancel out. One may wonder indeed whether people would register the death of a baby whose birth was not previously registered. At the same time, it is probable that those who have registered (or reported) the birth of a baby are very likely to register its death.

The argument can be more formally developed to show that the infant mortality rate is far more reliable than any other measurement in absolute terms. Consider the following notation for the degree of registration (i.e., the ratio of registered events to the events which actually took place):

a = registration of births;
b = registration of infant deaths for registered births;
c = registration of infant deaths for unregistered births.

B and ID being respectively the number of births and of infant deaths, we can express the infant mortality rate by:

$$q_0 = ID / B$$

The civil registration rate is:

$$r_0 = q_0 \times (a.b.B + (1-a).c.B)/(a.B)$$

This last result implies that the infant mortality rate is the same for the whole population. Thus:

$$r_0 = q_0 \times (b + c.(1-a)/a)$$

$$= q_0 / (b + c.(1-a)/a)$$

As per our hypotheses mentioned above, b should be close to one and c close to zero. Therefore, the factor $(b + c.(1-a)/a)$ is also very close to one. The civil registration infant mortality rate has thus the advantage of being close to the real rate in absolute value, almost independently of the quality of birth registration expressed by the parameter a.

This last property is of great importance for it ensures that variations between districts in the quality of registration are not likely to affect deeply the comparability of district-wise infant mortality rates. The same applies to the temporal analysis of infant mortality in which changes in the degree of underregistration will similarly remain of limited consequence.

There are of course limitations. Even though registration is supposed to take place immediately after the birth, mortality is very high within the first month and especially the first ten days: for that reason, deaths during the early neonatal period (within a week) are likely to be missed (both births and deaths going unregistered). Another criticism could be that people registering the occurrence of births and deaths probably belong to the better-off segments of the population; accordingly, the infant mortality rate of their offspring might be lower than that of the whole province.

Thus, despite their limitations, civil registration data offer a certain untapped potential for the analysis of some less known phenomena like annual demographic fluctuations or district-wise differentials. The variable (and considerable) extent of underregistration remains however a serious threat to the verisimilitude of the estimates derived from it.

IV.2 The National Sample Survey

The National Sample Survey (NSS) is a vast programme of representative surveys, launched in the early 1950's and conducted in all parts of independent India. The first aim of the NSS was to gather economic data, especially on incomes, wages and domestic expenses, but its schedule was soon enlarged to include related socio-economic issues such as employment, indebtedness and productivity, as well as demographic data in view of the failure of the civil registration system to yield reliable estimates of the vital rates.[18]

The NSS, under the aegis of the first Ministry of Finance and then the Ministry of Planning, is responsible for devising and conducting the surveys (usually annual or biannual rounds), data collection and processing and their publication in the form of specific reports. The considerable work involved in the tasks following the surveys resulted in unfortunate delays between the survey rounds and the final publications of the reports (up to 10 years).

The socio-economic wing of the Field Operations Division was entrusted with the surveys of demographic character, which were actually only a section of broader surveys encompassing a large number of other issues. Sampling stratification within each state is based on "agricultural regions" (as determined by population density and crop pattern); each district contains at least one stratum. Within each stratum, a sample of village and urban blocks is selected at random.

Each annual round is divided into six bimonthly sub-rounds. Data collected by the investigators (who are outsiders especially trained for the purpose) are checked after each sub-round by independent supervisors. Demographic questions include household particulars and the recent (demographic) events that have taken place in the family (chiefly births and deaths). Herein lies the source of the main deficiencies of the NSS demographic data, for retrospective questions -- the fragility of which is notorious -- find themselves lost in an extremely lengthy questionnaire. Questions regarding past family events require more concentration from the persons surveyed and more patience from the investigator. Recall lapses have been evidenced and analysed in the first report on fertility, but unfortunately this critical exercise was not repeated.[19]

In spite of the detail and the quantity of the figures

published in the reports, NSS demographic data are of disappointing quality and tend on the whole to underestimate dangerously the intensity of the phenomena they purport to describe, irrespective of the region to which they pertain.[20] As a result, they are unlikely to provide a good indication of the absolute level of mortality or fertility. However, in relative terms, they can throw some light on the spatial variations (rural-urban, India-Tamil Nadu..), and on the differences between age-groups (age-specific mortality and fertility rates), if one assumes that underregistration was the same for all regions and sub-populations. The NSS can also help to understand "peri-demographic" phenomena like morbidity, contraceptive behaviour and internal migrations for which we have no comparable data.

IV.3 Sample Registration System

Functioning

Following the 1961 census which revealed the fastest demographic growth ever recorded in India (not so in Tamil Nadu for reasons already mentioned), the laissez-faire attitude of the government vis-a-vis population problems changed into a more resolute approach which was soon to give birth to the introduction of large-scale family planning policies. But the first conclusion concerned the failure to forecast accurately the pace of demographic growth in India as was exemplified by the poor results of the population projections prepared for the government.[21] Obviously, neither the civil registration system nor the NSS were in a position to offer reliable estimates of the rate of population increase, and the Registrar General started the Sample Registration System (SRS) to monitor the components of growth at a state level. The SRS consisted in a permanent dual reporting system which covered about 2500 villages and 1300 urban blocks in the country and could soon prove to be the best source of

demographic information besides the census. The SRS has been often described and hence we will limit ourselves here to a brief account of its functioning before undertaking a more detailed analysis of the validity of its figures for Tamil Nadu.[22/]

The SRS started in 1964-65, with the selection of a large sample representative of rural and urban areas in every state, a sample supposed to cover approximately one per cent of the total population.[23/] In Tamil Nadu, 250 sampling units were selected; the first 150 consisted of villages (or parts thereof) which were stratified first according to the "natural rural divisions" and second, according to the size of the settlements.[24/] Another 100 sampling units were selected in urban areas and consisted of urban blocks selected from among towns stratified also according to their population. Selection of the individual sampling units is done at random from among the stratified villages and urban blocks.

Within each sampling unit, the procedure is the same everywhere in India: a census is first conducted from which a demographic register is established for each household.[25/] A local enumerator is entrusted with the task of continuous enumeration of births and deaths occurring in his unit. Most enumerators are local teachers and they are supposed to visit each household once every three months (to check whether they have not omitted any birth or death). They also maintain a separate register of births and deaths. Every six months a supervisor conducts an independent survey in which he updates the household registers and finally confronts his results with those recorded in the enumerator's register.[26/] Results are periodically sent to the regional office (The Directorate of Public Health and the regional census office) and corrected every month after the supervisor's survey. Consolidated figures are published regularly from Delhi in the SRS bulletin.

Data have been published for Tamil Nadu from 1970 (some estimates are also available for 1969 and before), and include birth and death rates as well as age specific death and fertility rates by sex and rural-urban zone.[27]

Evaluation

Though the SRS represents the first successful attempt to estimate the vital rates from a sample of villages and urban blocks, its functioning has failed to be equally satisfactory everywhere. I have already pointed out that in some states the SRS organisation was extremely deficient. But more general criticisms have been also levelled at certain weaknesses of the system; three main types of error can occur:

1. Errors in data collection
2. Errors while computing the rates
3. Sampling errors

The third type of error is chiefly a statistical matter regarding the representativeness of the sample; the evaluation of the confidence range has shown it to be reasonably good and it is thus unlikely to be a significant cause of distortion.[28/] However, the errors of the other two categories listed above are less easy to trace. For example, the probability of events being omitted during the enumeration by the investigator and during the supervisor's round may not be negligible, especially in rural areas where settlements are scattered.[29/] Migratory moves of any nature (seasonal, permanent..) are also bound to disturb the process of continuous enumeration.[30/] The care taken by the investigators in their work has been deemed to be of varying quality. In the case of Tamil Nadu, it seems evident that the SRS suffered from certain drawbacks at its inception, but a recent study has pointed to the very good quality of enumeration.[31]

Concerning the second type of error, what has been said on age previously is applicable to all the age-specific rates

computed by the SRS, except for the fact that children born in the sampling unit after 1970 have their date of birth recorded in the register. Infant and child mortality estimates are likely to be quite accurate as long as few events are missed. Migrations which cause the reference population to change constantly may also have resulted in slight errors in the computations of overall rates. Another possible source of errors is the age-structure of the SRS population. A more detailed study indicates that in the case of Tamil Nadu's sample the age structure proved to be rather close to that of the censuses except for the first age group (below 5 years). This specific discrepancy may actually be due to the deficiency of the census data themselves. It can be also noted that the SRS age distribution is relatively unstable, a probable consequence of the size of the sample. These imperfections are however unlikely to affect significantly the SRS results in Tamil Nadu.

This last section will be devoted to an evaluation of the reliability of SRS data. The first question relates to its ability to estimate accurately the level of the vital rates. The 1971-80 SRS figures average to 30.0 per 1000 and 13.7 per 1000 for the birth and death rates in Tamil Nadu. When applied to the intercensal period 1971-81 (9.92 years), these rates yield a natural increase of 17.56% when the intercensal population increase was 17.50% in Tamil Nadu.[32/] The difference turns to be to all intents and purpose negligible. This is a decisive result clearly demonstrating the success of the system in Tamil Nadu.

The exceptional quality of the SRS data in Tamil Nadu allows us to compare them with the civil registration data in order to answer two questions:

1. What is the level of underregistration in the civil registration?

2. What is the value of the SRS as an annual indicator of vital rates?

For this purpose, we have used the 1970-84 series of births and death rates from both sources, SRS and civil registration. Table IV.1 sums up the statistical characteristics of these series.

Table IV.1: SRS and Civil Registration Vital Rates, Tamil Nadu 1970-84

	Mean	Standard deviation	Coefficient of variation	Correlation coefficient	TREND LINE Intercept	Slope
	per 1000	per 1000	%	r	a	b
SRS						
Birth rate	29.4	1.40	4.7	-.838	31.3	-.27
Death rate	13.2	1.57	11.9	-.927	15.6	-.34
Civil Registration						
Birth rate	23.4	1.94	8.3	-.938	26.3	-.42
Death rate	7.9	1.05	13.2	-.919	9.5	-.22

Notes: Trend equation Rate = a + b.year (1970=0, 1971=1 etc.)
All correlation coefficients significant at 1%

Sources: Computed from SRS and civil registration annual figures.

The main observations are briefly summarized here:

- SRS rates are significantly higher than corresponding civil registration rates. This is obviously due to under-registration in the civil registration.

- Variability (measured by the coefficient of variation) is more pronounced for the death rate than the birth rate, and for the civil registration than the SRS. That mortality is more

unstable than fertility is not a surprising finding.

- A clear downward trend is discernible over the 15 years under examination for all rates and account for more than 70% of the variance of the series.[33/]

- The pace of decrease (measured by the slope of the regression line) is especially high for the civil registration birth rate.

Using the decadal averages, it appears that civil registration underestimated the birth rate by 20% and the death rate by 40%. The ratio between birth rates (Civil registration/SRS) has been rather stable around the mean value (with a coefficient of variation of 4.8% for both ratios), but a downward trend is discernible for the birth rate which could mean either the improvement of the SRS or a further degradation of the civil registration. The strange upward trend of the SRS birth rate over 1970-72 (moving from 30.0 to 32.4 p.1000) seems rather to suggest that during the first years of its functioning in Tamil Nadu, the SRS tended to underestimate the number of births occurring, especially in urban areas.

Even when civil registration data are clearly inadequate estimates, they are likely to give a good picture of the year-to-year fluctuations, as underregistration is a rather stable phenomenon (see above). On the other hand, SRS figures based on a sample may not be expected to reflect the yearly fluctuations so accurately. In order to compare the series, we have to remove their trend components. This has been done through two different procedures: by removing the linear trend and by removing the 3-year moving average value.[34/] Once trends are removed, the residual values are compared by a simple correlation analysis. If the SRS and civil registration reflected to the same extent the annual fluctuations of the vital rates, the correlation coefficient

would be maximal. Conversely, if the fluctuations around the trend were (for the SRS) purely stochastic, the coefficient would be close to zero.

Table IV.2 Correlation between the non-trend components of the SRS and civil registration series

Coefficient of correlation (r)	Birth Rates	Death rates
Residuals obtained by the linear trend	.5902*	.5868*
Residuals obtained by the moving average	.7222**	.7772**

Notes: * : significant at 5% (n = 15)
** : significant at 1% (n = 13)

Sources: computed from the original series

This table indicates that all residuals are significantly positively correlated, which means yearly fluctuations of the rates around the trend vary as expected in the same direction. However, when using the linear trend, the regression equations fail to account for more than 36% of the variance. Better results are obtained with the moving average which tend to offset the consequences of the less satisfactory figures of the SRS in the first years.[35] But even though they are significant, they do not account for more than 61% of the total variance of these fluctuations. Almost 40% of the cluctuations remain unexplained.

Conclusion

The infrastructure of the SRS has made it an exemplary survey for it combines a regular enumeration of vital events

with a periodical updating of the population registers (which amounts to periodical censuses). Contrary to what may have been observed elsewhere in India, the quality of the SRS data seems to have been better after 1975 than before.[36/] If the proof of the pudding is in the eating, the surprisingly close correspondence of 1971-81 growth from SRS and census returns is a major confirmation of the robustness of the system in Tamil Nadu. This allows us to evaluate the quality of the civil registration data and the latter appears to be still inadequate in Tamil Nadu (though better than in most other states). Finally, our last analysis has shown that the SRS is also sensitive to the annual fluctuations as depicted by the civil registration. However, our optimism may not equally apply to several more detailed demographic indicators, notably those relating to urban areas.

IV.4 Causes of deaths

Although the statistics on the causes of death are not per se crucial to the analysis of population dynamics, they, along with the age-specific mortality rates, are basic to the understanding of the sizeable mortality decline which has taken place in Tamil Nadu. Mortality decline since the last century is often analyzed within the framework of the "epidemiological transition theory" which stresses the role of the disappearance of contagious diseases (cholera, plague..) in the following upon improvements of the sanitary conditions in a given place. Nevertheless, the assessment of the respective importance of famine prevention and improved nutrition in the inception of mortality decline in India is still a controversial issue.

The civil registration system as was noted earlier offers data on the causes of deaths. However, as the causes of death are recorded by a layman (the registrar) who has no specific medical background, they tend to be vague except in the case

of some easily identifiable diseases. Consequently, the epidemiological interpretation of loose categories like "fevers" is difficult. Furthermore, the catch-all category of "other causes" included for a very long period the majority of the deaths.[37] The Bhore Committee mentioned above stressed the "gross inaccuracy" in the registered causes of death in the 1940's.

In the 1960's, the need arose to remedy this dramatic lack of information in order to assess the incidence of lethal diseases, especially in rural areas. After a first experiment conducted in 1961 in Rajasthan, the Office of the Registrar General launched a larger survey on aetiology of deaths covering most states, and called the Model Registration System (MRS). The following year, the MRS included for the first time rural areas in Tamil Nadu.

The survey is based on the sanitary infrastructure constituted by the Primary Health Centres (PHCs). In every state, a certain number of PHCs are selected in an approximate ratio of one PC per million population (1967 norm). Here follows a rapid overview of the functioning of the MRS.[38]

The PHC staff is responsible for a specific area, usually the main village of the area covered by the PHC. The field agent visits every household from where a death has been reported; only deaths occurring in the area are taken into account (including deaths of outsiders). He (or she) is therefore supposed to keep himself well informed of the death as well as the pregnancies and the births in order to cover adequately infantile mortality. As the field agents are not physicians, they identify the cause of death with the help of a specific manual devised for health workers (partly reproduced in the first MRS reports). Every month, they transmit a report to the PHCs recorder who in turn communicates it to the medical officer in-charge of the PHC. The field agent checks his

records every six months by visiting every household in his area. At regular intervals (presently every month), the medical officer himself checks 10% among the deaths reported to him. Data are forwarded by the regional headquarters (Directorate of Public health and Preventive Medicine, Madras) to the Office of the Registrar General in Delhi. They are published every year in a volume containing all state particulars ("Causes of Deaths - a survey"; variable titles since 1966).

MRS statistics are not intended to supplement civil registration data, and therefore provide no information on the overall death rates; thus, there is no way of evaluating the extent of the coverage. Age-specific mortality rates would in particular help assess the reliability of the MRS. The quality of these aetiological data depends chiefly on the efficiency of each PHC, its health workers and its medical officers. It seems that no sampling is done to select the PHCs, so that their small member in Tamil Nadu (34 in 1975, 64 in 1985) may jeopardize the representativeness of the system; in the 1970's, the annual number of deaths analyzed in Tamil Nadu was less then 2000 as against the 600,000 deaths occurring yearly in the state. Strangely enough, the number of deaths reported in Tamil Nadu by the MRS has been continuously falling in spite of the increasing number of PHCs selected by the MRS. This raises questions on the quality of the systems in the long run.

IV.5 Other demographic sources

Several other sources deserve mention as they contribute to our data base for Tamil Nadu's demography. The Reports on the Administration of the Madras Presidency are fairly detailed during 1876-1900. Apart from civil registration statistics and hospital returns, they contain a good summary of the health situation during the period under review. Unfortunately, the reports became rather sketchy after 1900 and have hardly improved since. On Madras City, the annual reports published

by the Corporation include some demographic materials which are particularly useful because of the good functioning of the civil registration system in the city.

A large number of local studies are presented in the two valuable volumes of the Census of India (1961, IX II-B-(i),(ii). Various data and observations are found in the well-known surveys conducted by Slater's students and repeated several times thereafter. More general considerations on the growth of the population in Tamil Nadu are found in the Memorandum by Srinivasa Raghavaiyangar, in Krishnaswami's study, and in the district Manuals and Gazetteers. Some reports are available on the famine conditions in 1876-78 (Famine commission) and in 1943-44 (Servants of India).

For the more recent period, the flow of statistics has been impressive, but village orlocal studies are rare. Worth mentioning are those by Mahadevan (1979) and Driver (1981). Much information is also be found in the publications of the Gandhigram Institute located south of Dindigul. A new source of data has been the Family Planning (Welfare) yearbooks published since 1972-73; the quality of these official data is however somewhat debatable. Lastly, the Registrar General has used the SRS structure to launch several surveys (fertility, infant and child mortality) which have yielded important results on the social determinants of demographic behaviour.

(1) According to the long study on civil registration system in Madras which represents the best documentation on the subject (Census of India 1961, IX, I-B (i) : 3-11, 350-54). I have not personally gone through the statistical records of Madras town and therefore I am not aware whether such data have been published from 1855. Other sources for this study are the annual Reports on the Administration of the Madras Presidency (hereafter abbreviated as RAMP) and the Census Reports. A useful description of the functioning of civil registration system in every province may be found in the Census of India (1971, monograph 4).

(2) Vital rates are the ratios of births or deaths to the total population and thus are also subject to errors due to deficient census coverage. Infant mortality however is independent infant deaths to registered births.

(3) The Census of India (1961, IX II-B (i):4) wrongly states that registration became legally compulsory in Madras town during 1867. In fact, the Act IX of 1867 only "provides for the registration of births and deaths" (RAMP, 1867-68:3).

(4) The description that follows is based mainly on the RAMP (1870-71: 198; 1875-76: 324-25, 327).

(5) Data for the army are older and more detailed, expecially for the European recruits (with special attention to the spread of venereal diseases).

(6) Act IV of 1871 introduced a new taxation system in the Presidency and Act III of 1871 directed the municipalities to use their funds for various purposes of sanitary improvement including registration of vital events (RAMP, 1870-71: 2-3)

(7) See RAMP (1885-86: 184). The Report of the Census of India (1911, XV, I:24), though it criticises the quality of municipal registration data, mentions that not less than 8,734 prosecutions under the 1884 Acts took place in the late 1890's.

(8) Most notably zamindari villages and tribal areas in Salem and North Arcot; see the Census of India (1951, III, I:281-83).

(9) On the district sanitary administration, see Baliga (1960: 209-213).

(10) See the Report of the Health Survey and Development Committee (1946, I: 153-157; II: 272-287).

11) See Census of India (1951, III, I: 55; 1961 IX-I-B(i):2-4).

(12) The Act is reproduced in the Census of India (1971 monograph 4; 39-41)

(13) Education level, occupation, religion, age, birth order, type of attention at birth or death.

(14) For instance, census volumes and district Manuals and Gazetteers (especially their statistical appendices published from the 1910's).

(15) The classification was as follows: Cholera, smallpox, fever (excluding malaria from 1951), bowel diseases (diarrhoea and dysentery from 1890), accidents (suicides, injuries snake bites), plague (from 1902), respiratory diseases (from 1921) and other causes. The last category tended to be very large due to the failure of the registrars to identify the specific cause of death.

(16).Civil registration data must be analysed as time-series. Interpretation of their components absolutely requires other estimates on mortality and natality rates.

(17) A good illustration can be found in the analysis of the 1876-77 crisis (Lardinois, 1984).

(18) For a general overview of the NSS, see Raza, Nazvi and Dhar (1978). Sampling and survey procedures are described in each Round's report. Demographic data from the NSS are described in Das and Bhatacharya (1977).

(19) See NSS (Report 7: 184-190). The tendency of mothers to forget gradually about their offspring is also well reflected in the census returns on fertility on which I have commented elsewhere (Guilmoto, 1984: 872-73).

(20) For a general discussion of the quality of NSS demographic data, see Das and Bhattacharya (1977). Data pertaining to Tamil Nadu (or the ex-Presidency as a whole) are too various and scattered to be summarised (NSS, Reports 76,110, 154, 175, 177, 180, 206). As to their quality, one may observe that the death rate in Tamil Nadu was estimated between 10.0 and 11.4 per 1000 during 1963-66 (NSS reports 175, 177 and 206) as against an actual rate lying around 16-17 per 1000. The birth rates seem to have been somewhat better estimated.

(21) Thus, in 1959, barely two years before the census, two government organisations (Ministry of labour and Employment and the Expert Committee on Vital and Health Statistics) prepared projections for the total population in 1961 which underestimated the intercensal growth respectively by 28.4% and 10.8%; computed from Natarajan (1982: 1944-96).

(22) More details on the SRS in Swam y (1980), Lal and Swamy (1977) Padmanabha (1982) and the SRS publications.

(23) The introduction of the SRS in the Union Territories has been progressive. In Bihar and West Bengal, the SRS encountered sufficient difficulties as to exclude their figures from the national average. From 1977 onwards, the sample (orginally based on the 1961 census results) has been gradually enlarged.

(24) The natural divisions are the following: Kaveri Delta (16 units), mountains (1), Coastal plains (64), and rest of the State (69). Village size stratification follows the 1961 population:less than 500 (3 units), 500-1000 (15),1000-2000 (42) and above 2000 (9), See SRS, Tamil Nadu (n.d.).

(25) This register includes only demographic data (age, sex, matrimonial status) and no socio-economic particulars.

(26) In Tamil Nadu, the figures are corrected with the help of Chandrasekhar-Deming formula (SRS, Tamil Nadu, n.d.:8) unlike what seems to have happened in the rest of India (Sinha, 1982: 408).

(27) Including the decomposition of infant mortality rates. Life tables were computed for 1971-75 and 1976-80.

(28) Standard errors are less than 1 per 1000 for the birth and death rates during 1975-77 in rural areas. See the SRS Bulletin (XIV (1), June 1980:28)

(29) This is precisely not the case in Tamil Nadu with its rather compact settlement pattern.

(30) Padmanabha gives a list of the most frequent errors related to migrations(1982:48).

(31) An intensive survey of 10% of the sample showed the underenumeration to be less than 2% in Tamil Nadu (SRS Bulletin, XVII (2), December 1983:14).

(32) The total increase includes net migration. However emigration from Tamil Nadu has been probably offset during 1971-81 by the arrival of repatriates from Sri Lanka.

(33) We have estimated the rates for the 1961-71 by using the trend equation of the SRS over 1970-1984. The resulting rate of natural increase of 15.5-16.1 per 1000 for 1966 (1961-71) implies a 1961 population of 35.1-35.3 million. See the previous section on underenumeration (II.2).

(34) Failure to remove the trend would result in artificially high correlation coefficients between SRS and civil registration series owing to their similarly strong downward trends.

(35) Several years of underregistration by the SRS result in several negative residuals. This is not the case with residuals computed from the moving average as they represent the deviation with respect to the average during three successive years.

(36) On the whole, it seems to us that the criticisms levelled against the SRS in the detailed work of Bhat et al (1984) do not apply to Tamil Nadu's experience.

(37) Other sources on epidemiology; hospital returns published in the RAMP's pilot surveys like that of Poonamallee reported in the Census of India (1961, IX, II-b (i), Djurfeldt and Lindberg (1975).

(38) The MRS is described in the Census of India (1971,monograph 4: 34-35) as well as in each of its annual reports.

Epilogue

As this paper has shown, there exist a large amount of data for analysis on population growth in Tamil Nadu since 1871. However, our data base often suffers from a lack of consistency over the period of study. We have presented two series of data which constitute the starting point of any further study of Tamil Nadu's population dynamics: the first of them consists of the district populations over 1871-1981, according to the 1981 administrative boundaries. They have been calculated by back projection and although these are only estimates, the estimation procedure ensures a very good level of accuracy. Tamil Nadu's population has been subsequently reconstructed from the estimated district figures: its age-structure has been derived from the available age-structures of the then districts of the Presidency.

The quality of these basic estimates clearly depends on the quality of the census data from they were arrived at; they therefore reflect the variable extent of underenumeration and age-misstatement which we have analysed. Even for the 1961 census which we have shown was most probably affected by a severe degree of underenumeration, no attempt has been made at offering a series of alternative figures.

The discussion on the institutions and the data they have produced has led us to relocate the issue of data reliability in broader socio-historical terms. Though unavoidable, this was not the central point of this paper, for the question of the statistical representation - the transformations of social formations into state- sanctioned statistical categories--need not be addressed through exclusively demographic references; several other institutions (legal, political...) came obviously into play at the same time to objectify the confrontation between the social actors. But in view of the numerous obstacles met by the institutions I describe to perform their tasks adequately, it was thought necessary to analyse some of the basic contradictions they have been attempting to overcome.

Age which is a crucial social characteristic central to demographic analysis cannot be faithfully captured by direct questioning since it refers to a time perception without immediate correspondence in the rural world view. But as ignorance does not discourage a reply, the proportion of "age not stated" worked out in most censuses to less than 1 per 1000 with a perverse effect on the indices of age accuracy. Similarly, other data and sources were examined and led to cautious conclusions. But this paper was primarily aimed at fixing the limits beyond which demographic inference will go astray. This was only a preliminary step, without any attempt at putting the data to use. The critical description of the sources and their availability along with the reconstruction of Tamil Nadu's census population before 1901 should allow us to proceed further.

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DISTRICT POPULATION IN 1981 ADMINISTRATIVE BOUNDARIES

APPENDIX-I

		1871	1881	1891	1901	1911	1921	1931	1941	1951	1961	1971	1981
MADRAS	M	215243	222880	248974	287890	304371	319411	398327	476346	756836	934227	1354325	1694107
	F	223995	228418	249200	282961	288761	291733	358724	434118	698060	842102	1224951	1582515
CHENGALPATTU	M	521219	532728	623594	664645	709754	748526	819216	904562	973125	1096065	1435848	1848124
	F	505674	528163	614417	655348	705239	738381	803897	877689	946125	1053159	1361924	1768384
N.ARCOT	M	726342	669345	805391	850848	956115	1008548	1147480	1311986	1447936	1581826	1905360	2230559
	F	722339	687731	816581	871284	976843	1022094	1151375	1301540	1451656	1564500	1850437	2183765
S.ARCOT	M	802036	828776	975866	1045631	1172807	1152414	1225072	1309554	1390463	1535928	1836950	2130444
	F	788770	832104	981582	1060178	1189759	1167671	1229435	1299199	1386304	1512045	1780773	2071425
DHARMAPURI	M	350200	241265	304775	356471	373361	358757	420687	489372	551501	676885	852274	1019362
	F	350599	251854	313327	362171	378725	359843	418143	480704	540090	655366	825501	977698
SALEM	M	521189	446584	558964	620740	646880	701738	788408	946528	1139121	1247000	1524329	1765822
	F	532458	471831	582964	643529	661758	710662	801542	947642	1140262	1224857	1468287	1675895
PERIYAR	M	345920	298557	378262	429312	456381	498432	527307	611308	696837	753747	914413	1057599
	F	349833	313628	398474	438527	463918	501041	532817	609535	695548	738832	882603	1010863
COIMBATORE	M	379123	371412	440324	479281	518343	548165	638284	737985	886167	1055844	1320626	1569570
	F	390143	391536	459601	497284	537407	553089	641399	732229	875744	1009048	1255536	1490614
NILGIRI	M	45858	51648	56895	61348	63509	67018	91928	112870	163880	213833	254120	321995
	F	32358	40564	44197	51534	55109	59501	77402	96839	147849	195475	239895	308174
MADURAI	M	651549	606027	747288	830784	938798	982453	1076188	1225439	1439330	1607309	1982905	2296614
	F	666512	644307	782724	868813	978481	1014416	1108883	1248573	1452638	1604091	1955292	2239283
TIRUCHIRAPPALLI	M	679393	676859	771884	812848	878921	923683	927898	1057718	1217684	1331913	1606721	1819668
	F	699541	717919	815818	856135	932188	962072	970602	1083866	1230340	1335727	1585413	1772652
THANJAVUR	M	893949	963047	995838	993767	1050587	1040081	1068466	1164584	1366222	1497423	1780806	2043724
	F	957606	1037175	1088238	1102754	1159836	1125797	1159251	1228637	1408204	1520481	1769257	2017821
PUDUKKOTTAI	M	219782	214016	256917	262419	278205	291593	273375	301840	343264	369334	471067	576335
	F	235293	234535	278511	285201	305208	316340	300267	320866	360838	381127	476284	580478
RAMANATHAPURAM	M	627710	584338	693433	724552	793966	822313	877941	954474	996095	1175689	1400835	1648422
	F	658674	656027	769756	809230	880536	906908	972726	1037196	1085545	1245924	1459372	1687015
TIRUNELVELI	M	677245	680135	757170	818908	882741	946968	1005419	1112566	1217892	1330220	1567558	1748321
	F	698735	722176	800238	868989	941849	994745	1077789	1174767	1287111	1400059	1632957	1825430
KANIYAKUMARI	M	170966	173137	175634	191737	215313	249389	291992	339835	417371	503735	619884	716958
	F	177492	178814	174451	194178	214774	244736	289859	337140	409009	493180	602665	706441
TAMIL NADU	M	7827724	7560754	8791207	9431181	10240052	10659489	11577988	13056967	15003724	16910978	20828021	24487624
	F	7990022	7936782	9170079	9848116	10670391	10969029	11894111	13210540	15115323	16775975	20371147	23920453

<u>Sources:</u> 1871-1891 (all districts) and 1901-1911 (Kanyakumari): estimated as decided in the text.

APPENDIX - II

TAMIL NADU, 1871-1981

	Census 1871	Census 1881	Census 1891	Census 1901	Census 1911	Census 1921	Census 1931	Census 1941	Census 1951	Census 1961	Census 1971	Census 1981
	MALES											
0-4	1213263	978484	1355039	1314692	1415754	1344345	1511607	1762200	1805504	2310519	2719380	2743586
5-9	1085867	1036148	1194491	1344549	1329625	1420490	1537503	1855800	1772838	2160347	2736792	2938740
10-14	888960	954485	897426	1170001	1186671	1271188	1392840	1562500	1831667	1912727	2406106	2907247
15-19	607876	675925	730740	782522	898113	923506	978322	1150400	1474215	1438680	1841548	2435636
20-24	611992	577923	683732	663352	834566	826388	932428	995500	1214225	1419095	1771662	2151253
25-29	621316	625917	731511	705105	812118	858605	966546	996400	1229665	1390254	1576455	1914575
30-34	607980	632765	686088	761956	760240	877636	828235	900200	1068822	1176243	1383131	1593378
35-39	479457	503811	582517	558834	606421	666261	820616	851300	1014729	1140189	1418793	1588003
40-44	484643	465294	548730	641839	671169	669025	676922	748200	891237	977985	1172231	1423398
45-49	300445	298601	374547	360123	431880	419178	541110	637000	755130	839795	1107539	1340784
50-54	333623	296471	354566	444857	473167	513852	446774	546500	672449	712404	859730	1047538
55-59	156756	157001	194660	181868	229691	241473	311262	354000	448792	485410	630592	794597
60-64	435545	357929	457160	501482	590638	627542	633823	310262	397811	436694	542145	678679
65-69								156320	191166	218686	295709	398216
70&+								230418	235480	291951	366207	531994
60&+	435545	357929	457160	501482	590638	627542	633823	697000	824457	947331	1204061	1608889
TOTAL	7827723	7560754	8791207	9431180	10240053	10659489	11577988	13057000	15003730	16910979	20828020	24487624
	FEMALES											
0-4	1281863	1039134	1426447	1384534	1484570	1404287	1573070	1797200	1815389	2299584	2673199	2663674
5-9	1072588	1070041	1211548	1381638	1370495	1470387	1537649	1855900	1803944	2147248	2688057	2839660
10-14	760090	861660	794691	1075852	1121240	1188121	1324755	1475400	1835622	1837663	2339755	2802251
15-19	583189	630134	704696	732724	905082	864659	987176	1100700	1397473	1414683	1752698	2466065
20-24	757658	713701	839622	845377	1003325	1018850	1091116	1121200	1315137	1552508	1761650	2166633
25-29	688190	721964	827962	807617	888403	964110	1131139	1136100	1302121	1523621	1777409	2022368
30-34	676777	705033	770882	872766	862518	962098	892807	958000	1122871	1205635	1418746	1568264
35-39	423500	453758	532906	509743	567634	588906	803912	835100	963254	1081362	1393425	1677722
40-44	499342	508310	577540	684392	718504	720528	644326	742200	867581	891062	1077900	1297850
45-49	261442	286458	339828	324538	391654	385087	514693	597500	734720	761554	970925	1228534
50-54	364547	361453	411723	486763	512052	547668	454323	525500	674943	681878	793286	958991
55-59	143427	149812	182829	164260	208768	208538	301447	312200	423540	439925	562480	703830
60-64	477410	435324	549405	577914	636145	645790	637698	338462	416334	431562	515090	644089
65-69								152844	192649	208828	280016	373147
70&+								262194	249739	298862	366511	507375
60&+	477410	435324	549405	577914	636145	645790	637698	753500	858722	939252	1161617	1524611
TOTAL	7990023	7936782	9170079	9848118	10670390	10969029	11894111	13210500	15115317	16775975	20371147	23920453
	BOTH SEXES											
0-4	2495126	2017618	2781486	2699226	2900324	2748632	3084677	3559400	3620893	4610103	5392579	5407260
5-9	2158455	2106189	2406039	2726187	2700120	2890877	3075152	3711700	3576782	4307595	5424849	5778400
10-14	1649050	1816145	1692117	2245853	2307911	2459309	2717595	3037900	3667289	3750390	4745861	5709498
15-19	1191065	1306059	1435436	1515246	1803195	1788165	1965498	2251100	2871688	2853363	3594246	4901701
20-24	1369650	1291624	1523354	1508729	1837891	1845238	2023544	2116700	2529362	2971603	3533312	4317886
25-29	1309506	1347881	1559473	1512722	1700521	1822715	2097685	2132500	2531786	2913875	3353864	3936943
30-34	1284757	1337798	1456970	1634722	1622758	1839734	1721042	1858200	2191693	2381878	2801877	3161642
35-39	902957	957569	1115423	1068577	1174055	1255167	1624528	1686400	1977983	2221551	2812218	3265725
40-44	983985	973604	1126270	1326231	1389673	1389553	1321248	1490400	1758818	1869047	2250131	2721248
45-49	561887	585059	714375	684661	823534	804265	1055303	1234500	1489850	1601349	2078464	2569318
50-54	698170	657924	766289	931620	985219	1061520	901097	1072000	1347392	1394282	1653016	2006529
55-59	300183	306813	377489	346128	438459	450011	612709	666200	872332	925335	1193072	1498427
60-64	912955	793253	1006565	1079396	1226783	1273332	1271521	648724	814145	868256	1057235	1322768
65-69	0	0	0	0	0	0	0	309164	383815	427514	575725	771363
70&+	0	0	0	0	0	0	0	492612	485219	590813	732718	1039369
60&+	912955	793253	1006565	1079396	1226783	1273332	1271521	1450500	1683179	1886583	2365678	3133500